

# PUBLIC WORKS

**Oct.**  
**1955**

**CITY, COUNTY AND STATE**

**FOUR-COLOR PICTURES  
AND FLOWSHEETS OF  
DALLAS AND CHARLOTTE  
SEWAGE TREATMENT  
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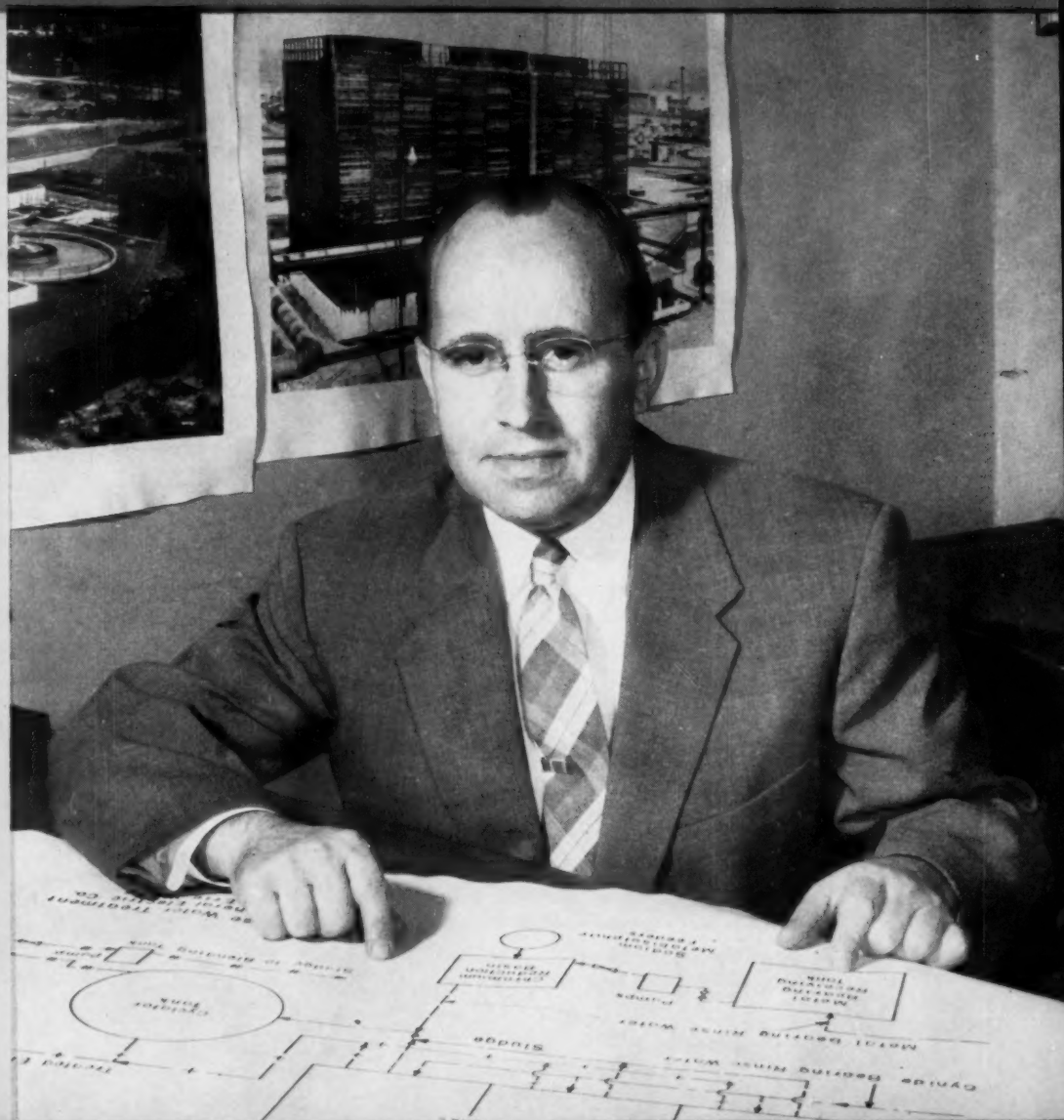
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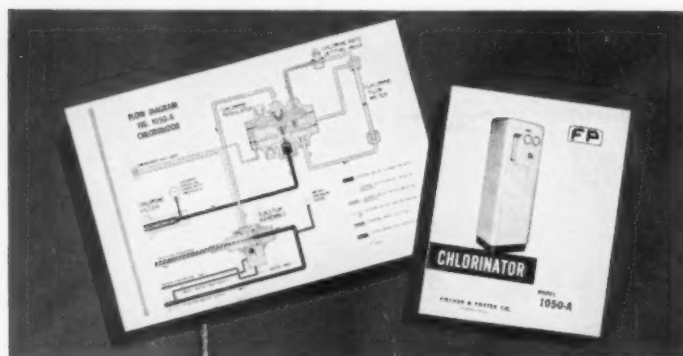
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**Ken S. Watson is consultant, Water Management and Waste Control, Plant Engineering & Maintenance Services, General Electric Co., responsible for organizing and developing a company-wide program. More on page 30.**



Willard Harper, Chief Chemist, adjusts the setting on a Ratochlor unit.



Flow diagram shows the simplicity of the Fischer & Porter Model 1050-A Chlorinator. This 6-page folder gives additional information. Send for your free copy today.



*complete process instrumentation*

## F&P Chlorinator Proven Under Severe Test by City of Columbus

Freedom from corrosion, low maintenance  
and operating costs induce  
city officials to acclaim its virtues

Faced with the need of replacing its 40-year-old chlorinator, the City of Columbus, Ohio, tested an F&P chlorinator for 8 months under the most adverse conditions. So pleased were Marshall Houghn, chief of the Dublin Road plant, Willard Harper, Chief Chemist, Paul C. Laux, Water Division superintendent, and Floyd C. Redick, Public Service Director, with its performance that two new Fischer & Porter Chlorinators and an Evaporator were installed. The Dublin plant keeps one chlorinator in constant operation and the other for reserve purposes.

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- Simplicity of operation—internal piping in vacuum system employs "snap-in" type construction with "O" rings requiring no unions
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Fischer & Porter offers a wide variety of chlorinators for use in municipal water systems, industrial plants, swimming pools. Consult your local F&P representative or write for free literature.

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Measuring, recording and controlling instruments  
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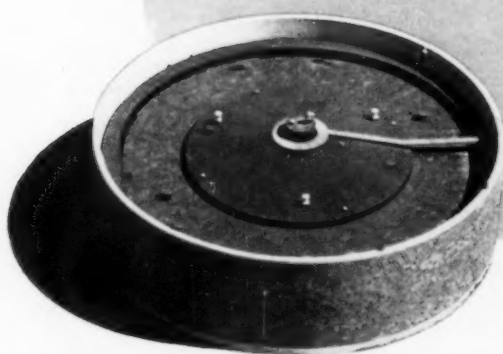
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**provides  
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solids loading for  
sludge digestion**

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1. Smaller tanks
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3. Non-formation of dense floating solids, termed "scum", eliminating former pro-ration of digester volumes for holding "scum".
4. Consistently highest degree of volatile solids reduction and gas production—through fundamental application of a simple gas diffusion mechanism—with lowest tank volume and simplified piping, without increase in operation supervision requirements.

*\*Exclusive of sludge storage volume that may be required by subsequent disposal methods.*

**Reports Available**

Reports describing the PROCESS in detail are available on request. Write to Department F.

*\* Patents Applied For*

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Subsidiary of Food Machinery and Chemical Corporation

**SEWAGE EQUIPMENT DIVISION**

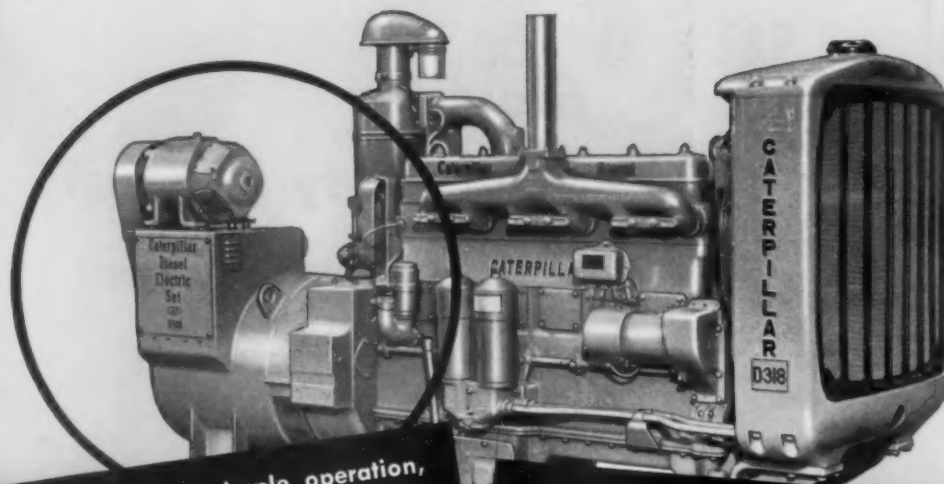
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# PUBLIC WORKS MAGAZINE

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THE MOST USEFUL ENGINEERING MAGAZINE  
FOR CITIES, COUNTIES AND STATES



# FOR *Big* HOUSING PROJECTS IT'S CLAY PIPE ...by the **MILE!**



## More Than 100 Miles of Clay Pipe Go Into 9,000-Unit Housing Project at San Diego

An estimated 630,000 feet of Vitrified Clay Pipe has been installed in San Diego's city-wide defense housing project . . . constructed under Title IX of the Federal Defense Housing Program. The 9,000-unit rental project cost approximately \$60 million and is operated under private management.



Yes, Clay Pipe is being used literally *by hundreds of miles* in big housing projects all over the country. It's the *only* pipe that's absolutely safe against all the common causes of sewer pipe failure. Clay Pipe can't rust or corrode. It's completely unaffected by the acid gases that sewage waste generates. Hot detergent solutions can't cause it to turn soft or spongy. And for the maintenance-conscious builders of rental property, Clay Pipe is a "must," because it's the only pipe that is *guaranteed for 50 years*. Every section of Vitrified Clay Pipe has a built-in future of trouble-free performance. The next time you plan or install new sewerage, insist on Vitrified Clay Pipe. *It never wears out.*

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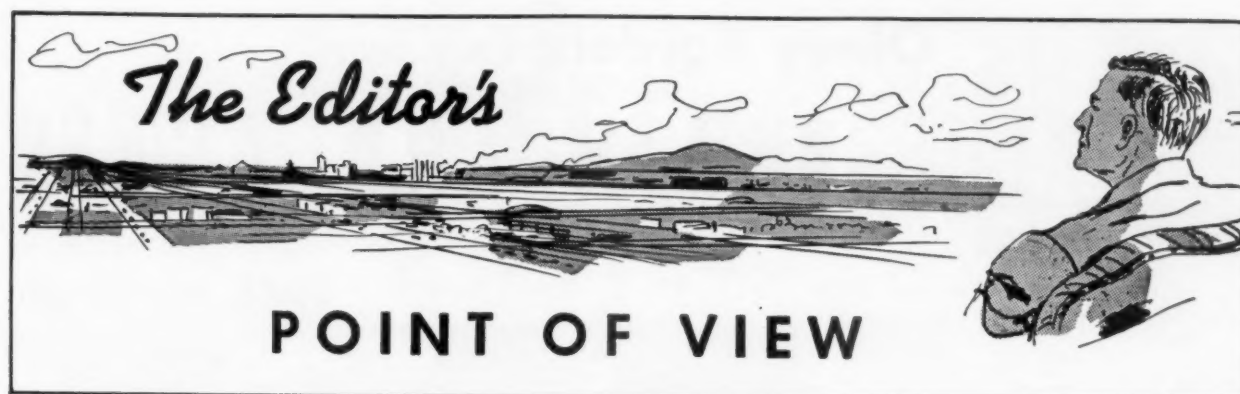
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C-155-2

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### **PUBLIC WORKS Moves To Its New Office In The Suburbs**

**B**ETTER to serve its readers, PUBLIC WORKS has moved to Ridgewood, New Jersey, where it occupies a new and modern building, designed and constructed solely for its use. This move has been under consideration for some time as the offices we have occupied for 25 years in New York City were inadequate and outmoded. The new building is located in the edge of Ridgewood's business district, about two blocks from the Erie Railroad station and the bus terminal. In the near future, when landscaping and other outside work is fully completed, we will print a picture of this new building.

We hope our friends will come by and see us in our new home. Ridgewood is just off the main highways entering the metropolitan area from the west; and it is easy to reach from New York City. If you can, let us know you are coming; if not, just come in and see us.

### **New Rainfall Records Have Been Set in the Northeastern States**

**N**EW RAINFALL records were set this past summer in New England, New York and Pennsylvania. Floods caused record-breaking damage. These "sod-busters and gully-washers" demonstrated anew that past rainfall and runoff records are a guide only; and that the ultimate flood is yet to come. Topography has much to do with the damage that flood waters can cause, and no one can change a narrow and steep-sided valley to a broad flat-sloped one. Nevertheless, these storms should be another reminder to engineers that they should take nothing for granted and should utilize every safety factor possible and usable.

### **Highway Departments Must Have Readiness— and Equipment—To Serve**

**T**HE early months of the year 1955 brought unusually severe weather to many parts of the country, with snow and ice. Highway departments, whether state or county or city, have the obligation to keep open our highways and streets

irrespective of weather conditions. In fact, with the present volume of traffic on the roads day and night, month in and month out, highways must be kept open to prevent disaster to travelers.

All this means that enough equipment—and modern equipment—must be available, not only enough for average storms, but enough to meet emergencies. Not all of our states, cities and counties have appreciated that the big increase in traffic each year requires more and better equipment to meet these needs.

Now is a good time to review, in the light of the past winter, the need for more plows, trucks, salt and sand spreaders, tractors and loaders and to clear the way for ordering them so they will surely be available for next winter. Whether it be mild or severe, no one can tell; but all ought to be prepared adequately.

### **What To Do To Get More of the Engineers the Country Needs**

**T**HERE HAS been much talk about our need for more engineers, but very little of it has contained constructive and down-to-earth suggestions for remedying the situation. Much can be done; however, since making engineers is a long-time process, results will come slowly.

First and foremost is to provide a pay scale that will attract young men to the profession. The boys who can be the engineers of the future are smart enough to evaluate pay opportunities. If those in civil engineering are comparable to those in other fields, our enrollment of student engineers will grow. But simply pushing up the bottom of the pay scale to outbid others for some of the young men needed is not the answer. The upper levels must be raised very appreciably to provide opportunity for greater advancement for those who now compose the great body of the profession.

We urge, that as a start, early and vigorous action be taken to raise city, county and state engineers salaries—say half-way between where they are now and where they ought to be. We know this is the kind of shot-gun approach to the problem that we normally dislike; but it is way past time to take some drastic action.



**Olney Borden, Engineer**

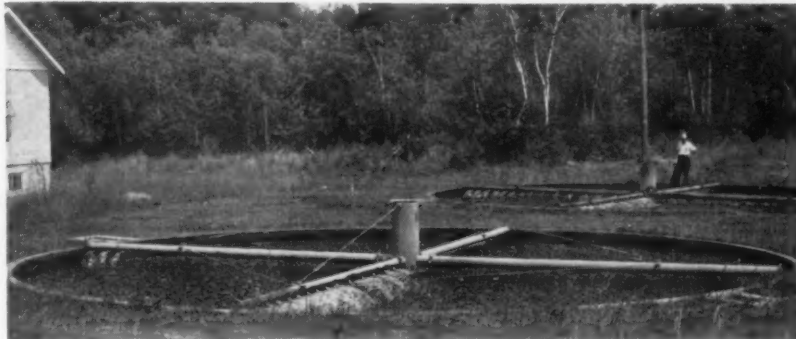
# AGAIN AND AGAIN

**1948 - Monticello**



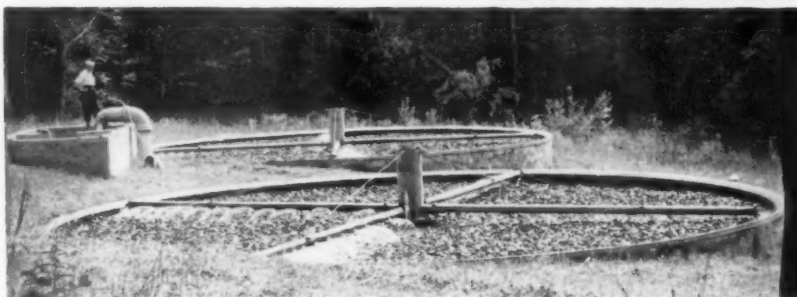
**EQUIPMENT INCLUDES:** Link-Belt settling tanks and screens, Dorr-Oliver digester; vitrified clay TFFI filter blocks, American Well Works distributors for filters, pumps; Contractors: McElwee-Courbis Construction Co., Camden, N.J.

**1952 - Sackett Lake**



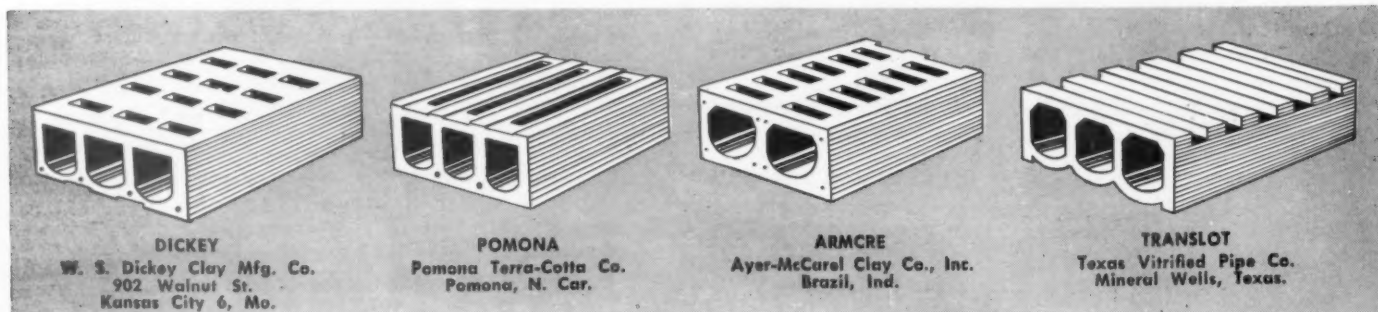
**EQUIPMENT INCLUDES:** 2 Dorr-Oliver Inc. 40' diam. distributors and 2 40' diam. clarifiers; vitrified clay TFFI filter blocks. Contractor: Mastro Contracting Co., Monticello, N.Y.

**1952 - Kiamesha**



**EQUIPMENT INCLUDES:** 2 Dorr-Oliver Inc. 40' diam. distributors and 2 40' diam. clarifiers; vitrified clay TFFI filter blocks. Contractor: Mastro Contracting Co., Monticello, N. Y.

## TRICKLING FILTER

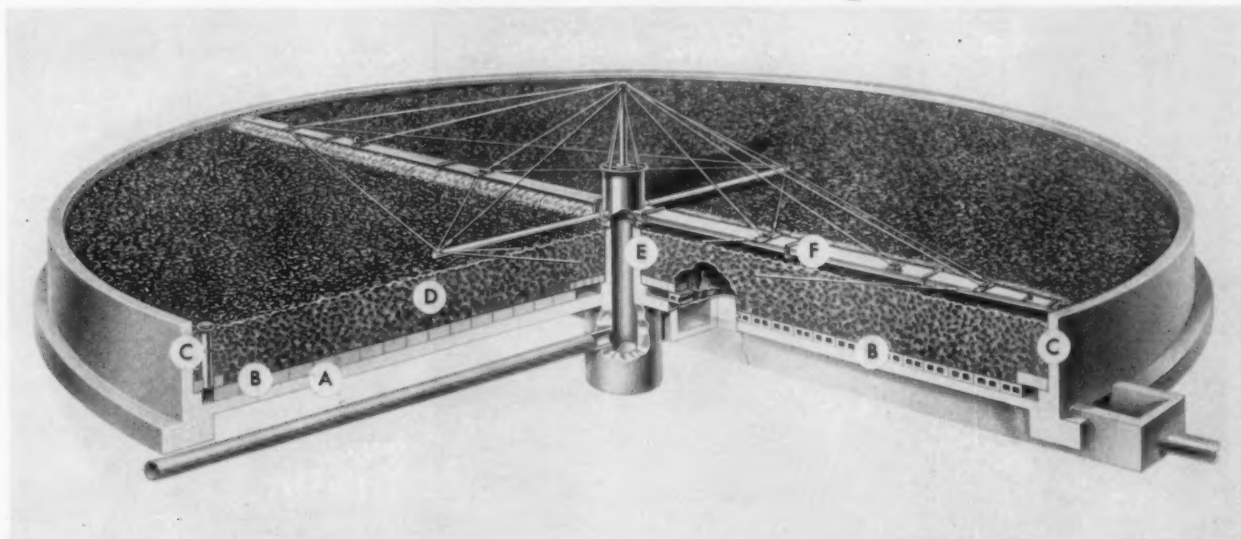


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# SPECIFIES TFFI UNDERDRAINS!

... in these New York Trickling Filters

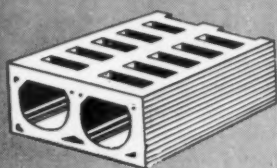


This drawing, furnished by Dorr-Oliver, Inc., gives a clear picture of the components of a modern trickling filter.

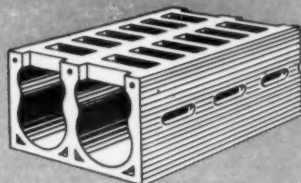
## Here's why . . .

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| <p><b>1</b> <b>LOW COST</b> Overall outlays are generally lower, in the combination of initial and operating costs.</p>                              | <p><b>4</b> <b>LONG LIFE</b> Trickling filters are built for long life, to outlive the bonds you issue to pay for them.</p>                                      |
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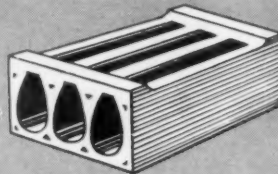
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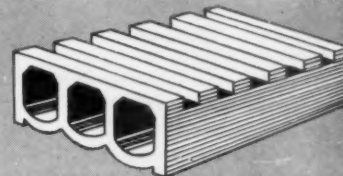
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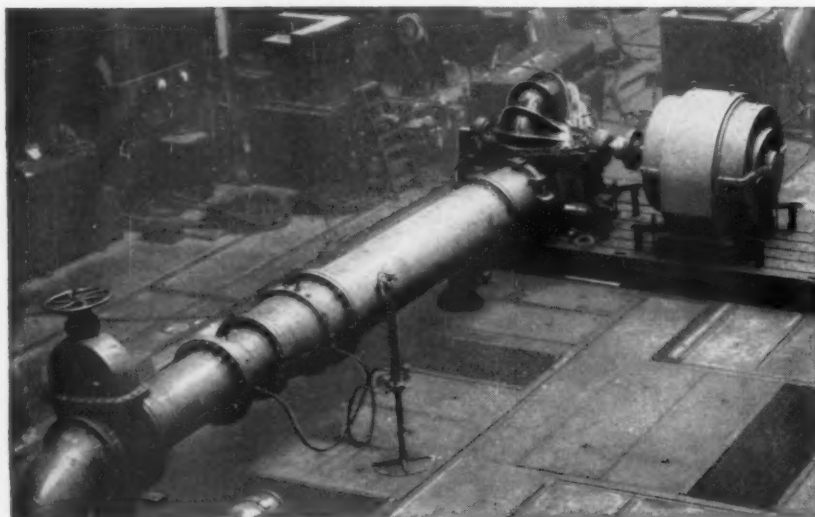
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# Keep your eye on WORTHINGTON

## Pump research primes pump progress



We have a lot of experience at Worthington—more than 114 years of it—and we're picking up more all the time.

But technology advances every day. Each step forward brings with it new and unsolved pumping problems. That's why Worthington's research and development program is continuous. That's also why we like to work with you during planning to get the jump on problems before they reach the costly stage.

### Experts for every problem

For your day-to-day pumping problems, our sales engineers are thoroughly trained in pump applications in every field, and can usually supply the right answer fast. Naturally, for the really tough ones, our staff engineers back them up with all the equipment and facilities of our shops and laboratory. In addition, factory-trained troubleshooters are available to cope with any problem that may arise in the field.

### From cat-cracker to atom-cracker

Our specialists, covering all major industries, work as a team. Together, they bring to bear on any problem a vast store of experience. They've successfully solved pumping problems and helped pioneer new developments in public works, atomic energy applications, the oil industry, and the chemical industry—to name a few.

So keep your eye on Worthington; we probably have a money-saving answer to your pumping problems. C.S.I

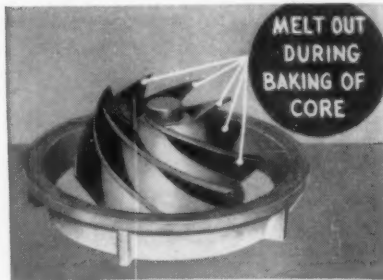


**TEST STAND CAPACITY UP TO 100,000 GPM** is provided at Worthington's Harrison plant (above). Built over a man-made half-acre lake, the test stand is used as a production tool to check pumps from fractional horsepower up. This flexibility comes in handy—in one line alone Worthington can put together 60,000 different standard pumps out of 650 parts in six standardized sets of liquid ends.

**DIRECTING PUMP TEST OPERATIONS** from central control room (left) where special measuring instruments speed collection of performance data. Worthington pump specialists can afford to be objective in considering your pump application problem. They select from the most complete line of pumps offered by any manufacturer.



**WORLD'S FIRST ATOMIC-POWERED SUBMARINE, NAUTILUS**, undergoing sea trials. In atomic development since 1941, Worthington recently built special engine room equipment for both atomic submarines, *Nautilus* and *Sea Wolf*. Worthington continues to figure prominently in supplying this new field of atomic energy, keeping pace with its new and rapidly changing requirements.



**EUTECTIC CASTING**, used in making standard Worthington pumps, frees engineer from casting restrictions. Formerly, design of impeller and diffuser blades had to allow hand withdrawal from fragile sand core. Eutectic casting uses a low-melting-point alloy to form blades, melting this alloy out during baking. This permits design flexibility for maximum hydraulic performance.



**VITALITY OF WORTHINGTON RESEARCH PROGRAM** is shown by the more than 300 articles in the technical press during the past five years by Worthington people. This flood of informative technical literature not only reflects our ability to keep pace with the changing hydraulic requirements for modern pumps, but also highlights the important contributions by Worthington to the knowledge of pumps.

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.



**HANDLING 11,000,000 GALLONS PER DAY**, the new sewage plant at Salem, Oregon, has Worthington pumps for continuous, economical pumping power. John W. Cunningham & Associates, Portland, Oregon, were the Consulting Engineers for this project.

## Salem's sewage system relies on these pumps

"... since the day our plant opened in 1952, Worthington pumps have been in daily operation — with never a breakdown. And because these pumps are the very life-line of our plant, their reliability has proved invaluable."

That's what Chief Operator Cliff Reed says about the eight Worthington centrifugal pumps at work in the new sewage disposal plant serving Salem, Oregon.

Mr. Reed isn't alone in his opinion about the rug-

ged Worthington units. We've had similar reports wherever Worthington pumps, comminutors or engines have been used — and that means water works and sewage plants all over the world.

Helping municipalities with their sewage and water works problems is our job today — has been for over 100 years. Write today for Bulletin W-317-B16 to Worthington Corporation, Public Works Division, Harrison, New Jersey.

W.4.11

# WORTHINGTON



**ALL MAJOR PUBLIC WORKS EQUIPMENT UNDER ONE RESPONSIBILITY**

**Water Works Pumps • Sewage Pumps • Comminutors • Vertical Turbine Pumps • Vacuum Pumps**

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Ambassador Hotel  
Atlantic City  
Sewage and Industrial  
Wastes Meeting  
October 10 to 13**





**SOLVING SOME PRESSING PROBLEMS.** City Manager R. E. Froneberger is shown watching many of his problems disappear. The city-owned Bullclam has wiped out complaints he used to receive about smoke and odor drifting from the open dump to a nearby park. He no longer hears about the smoke haze from the open dump that formed over a main highway to make driving downright deadly. And the threat to the city's health from rats, flies and mosquitoes bred on the open dump is past history.



**DOZES.** Greenwood's INTERNATIONAL DROTT "One-Man Sanitation Squad" dozes 120 cubic yards of refuse daily from haul trucks into gullied area.



**COMPACTING.** With the refuse in place, the INTERNATIONAL TD-14A with DROTT Bullclam compacts it into a dense mass in minutes by crushing and ironing it with the specially curved Bullclam front.

Thousands use our Readers' Service card to keep up to date . . . do you?

# How Greenwood Buries Its Garbage Disposal Problems

**South Carolina city checks 2½ years—then selects INTERNATIONAL DROTT Bullclam Shovel Method of Sanitary Fill; eliminates odors and smoke in park, smoke haze from main highway, health hazard from rats, flies and mosquitoes**

For years, the city of Greenwood, South Carolina, burned its refuse but discovered the residents of the city were getting burned up also.

People didn't like the stench and smoke that drifted from the burning dump into the park, nor did they like the smoke haze that enshrouded a nearby main highway and made driving in the vicinity of the dump hazardous. And then, too, an ever-increasing swarm of flies and mosquitoes and rats were being swarmed on the city after deserting their breeding grounds—the city dump. But the Greenwood city administration has buried these complaints for all time by adopting the Bullclam Shovel method of Sanitary Fill with an INTERNATIONAL TD-14A crawler equipped with a DROTT Bullclam.

This equipment was selected only after a careful equipment study that lasted 2½ years and

now approximately 18,000 people are benefiting from the Bullclam Shovel method of Sanitary Fill.

The advantages of sanitary fill methods are now generally recognized, but to learn the advantages of the DROTT Bullclam Shovel method of Sanitary Fill as practiced with an INTERNATIONAL crawler and DROTT Bullclam, call your International Industrial Power Distributor for a demonstration today. He'll show you the only machines specially built for this operation and you'll see for yourself how these units are able to handle the greatest amount of refuse daily for the least cost. Call today for details on this "One-Man Sanitation Squad."

**INTERNATIONAL HARVESTER COMPANY  
CHICAGO 1, ILLINOIS**

**DROTT MANUFACTURING CORP.  
MILWAUKEE 8, WISCONSIN**



**COVERING.** All Greenwood refuse is covered by an earth seal at the end of each day's operation. The Bullclam obtains and transports the cover material to the fill where the earth is spread evenly over the compacted refuse. No settling. No tasty tidbits for flies, rats or mosquitoes to feed on.



**BULLCLAM BY**

**DROTT**

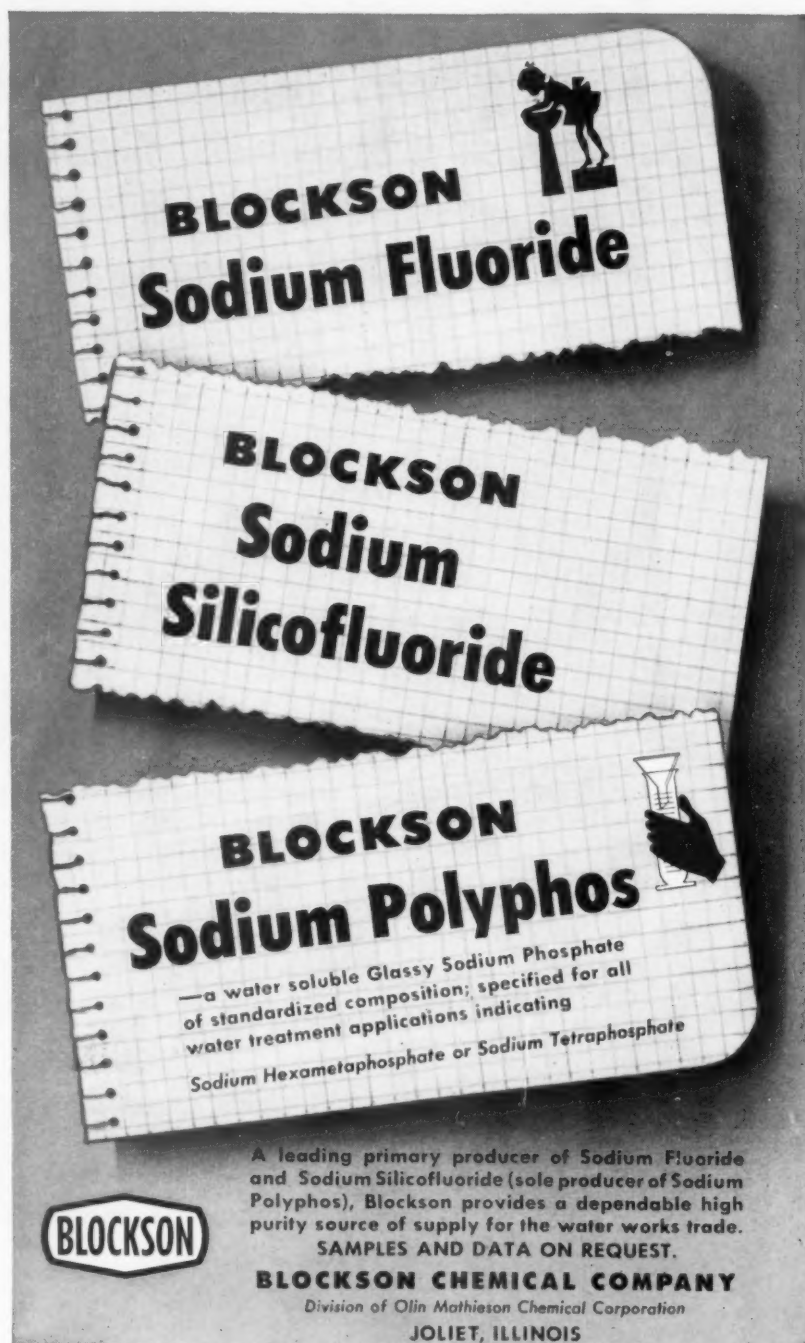


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—a water soluble Glassy Sodium Phosphate  
of standardized composition; specified for all  
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**BLOCKSON**

A leading primary producer of Sodium Fluoride  
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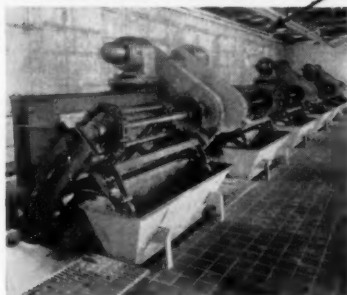
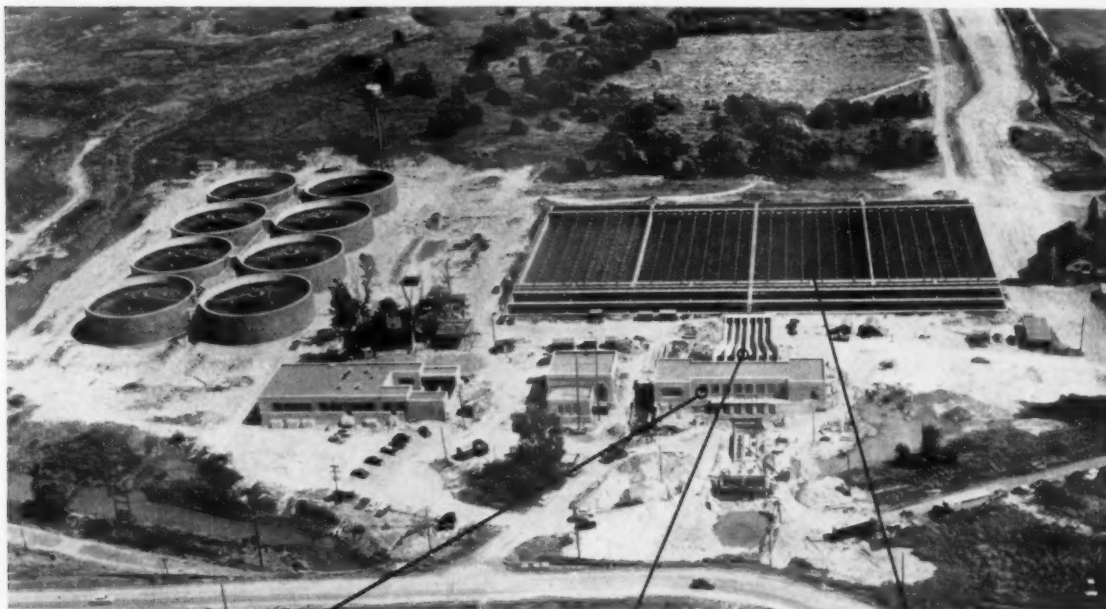
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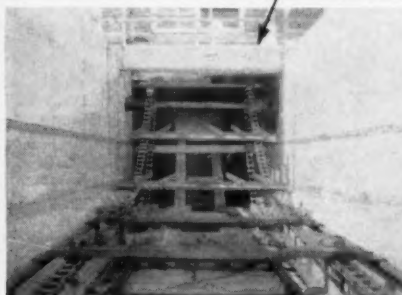


EN ROUTE TO THE F.S.I.W. CONVENTION, SEE THIS INSTALLATION—ADJACENT TO THE PHILADELPHIA INTERNATIONAL AIRPORT

AT THE CONVENTION STOP BY OUR BOOTHS 78 AND 79



Six Link-Belt inclined bar screens, each with eight rakes, discharge screenings onto steel belt conveyor.



Sewage from grit and screen building flows into six grit channels, where grit settles and is removed by L-B grit collectors and washing-dewatering screw conveyors.



Primary settling tanks use Link-Belt longitudinal and cross collectors, scum skimmers and drives.

## Philadelphia's Southwest Sewage Works demonstrates how to keep treatment capacity ahead of population growth

**F**ORESIGHT was a key element in planning this new Philadelphia sewage plant. It had to provide practical waste treatment for a population of 870,000—yet be able to serve the estimated 1,200,000 expected by 1970. Working with city engineers, Link-Belt helped supply the efficient screens, grit collectors and sludge collectors to handle 136 mgd.

This \$8 million plant is part of Philadelphia's ten-year, \$80 million program for the elimination of stream pollution. Link-Belt Straightline Collectors were also chosen for the Northeast Works with a capacity of 125 mgd, completed in 1951 as the first phase in this huge project.

Whether you're concerned with large municipal or small industrial waste treatment . . . or need the finest in modern water purification equipment—count on Link-Belt to provide maximum efficiency at all flow conditions. Our engineers can call on a complete line of equipment . . . will work with you, your chemists and consultants.

# LINK-BELT

SANITARY ENGINEERING EQUIPMENT

**LINK-BELT COMPANY:** Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

13,044

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## FOR THE FIRST TIME IN ALL-ALUMINUM

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Both P & K units feature more-than-adequate strength against all stresses and strains through exclusive use of P & K originated design and fabricating methods.

Basically one-piece construction means no expensive, time consuming pre-assembly... no costly inventories of small parts.

And, P & K All-Aluminum construction means easy installation, corrosion-free, maintenance-free life, plus the clean, attractive appearance that identify all P & K designs.

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THE P &amp; K 25-ft. MAST ARM

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# HOPTO

**DIGGER • SHOVEL • CRANE**

*Does the work of 16 MEN!*



MODEL 200 DTM  
BACKHOE OR  
SHOVEL BUCKET

**digs DEEP ... lifts HIGH ... easy to operate!**

Here's the fast-cycling HOPTO unit that equips you to profitably handle more jobs at lower equipment investment! The completely hydraulic HOPTO mounts on any 1½ ton or larger truck ... one that may have been 'written off' but can still serve as a mobile base for this work-hungry, big-capacity unit!

Four simple and easily mastered control levers give finger-tip operation that is fatigue-free. That means more work done *more safely!* Retractable hydraulically operated outriggers quickly level unit ... provide a solid, *safe* base from which to operate.

#### OTHER MODELS

From the large track-type continuous Badger Trencher down to the trailer-type HOPTO, Badger manufactures a complete quality line of digging equipment. HOPTO is also available as a power take-off operated or self-powered trailer model, as a unit for rear mounting on track-type or wheel-type tractors, as a complete self-powered wheel unit, the crawler unit shown below, the truck mounted unit illustrated above and a slightly smaller unit for truck mounting. HOPTO builds a *quality* unit to meet *your* needs, *exceed your expectations.*

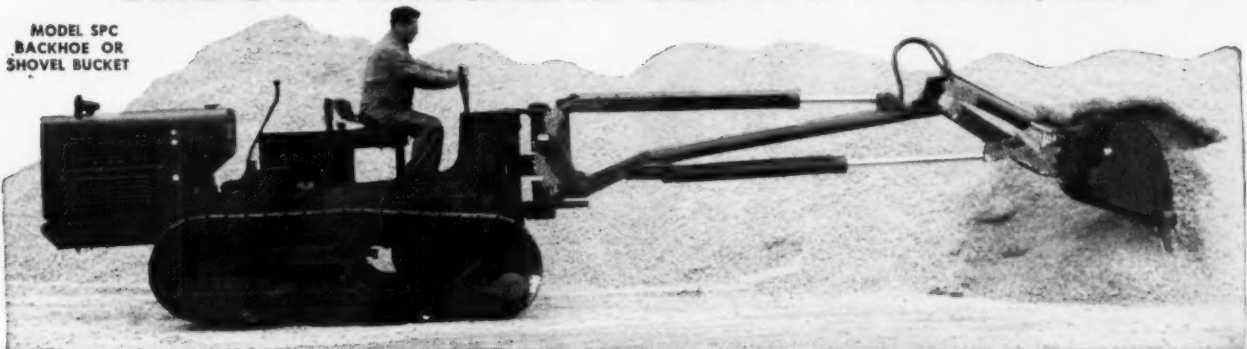
#### CHECK THESE HOPTO FEATURES

- Dipper stick extension tilts digging unit 135°; permits straight side, vertical digging. Eliminates hand work.
- Digs 11½' below surface.
- Lifts 13½' high with shovel bucket; more than 9' with backhoe.
- Alloyed steel hardened pins and self-aligning bearings at all pivot points.
- Variety of widths and types of backhoes and shovel buckets.
- Backhoes and shovel buckets have H & L teeth.

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**BADGER MACHINE CO. DEPT. P WINONA, MINN.**

MODEL SPC  
BACKHOE OR  
SHOVEL BUCKET



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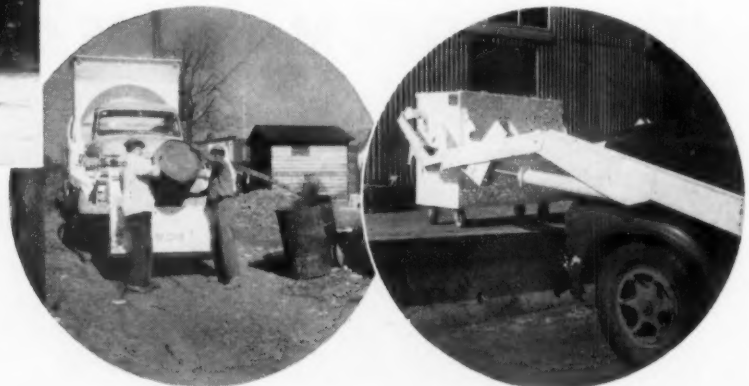
BEFORE AND AFTER scenes below, photographed in Asheville, N. C., represent typical conditions where unsanitary, costly conventional handling of refuse were corrected with the modern, low cost Dempster-Dumpmaster and its detachable containers.

## Here's an entirely NEW for any City or Town



THE FLEXIBILITY of the Dempster-Dumpmaster includes safe front-end collection of refuse from conventional cans in alley pickup. Men are always in safe area in full sight of driver. Containers may be handled from most any platform height, as shown in second photo at right.

IT'S THE LATEST development in the family of Dempster-Dumpster equipment for low cost handling of refuse. A glance at the pictures and one immediately realizes this Dempster-Dumpmaster is the natural solution to the great majority of costly and, unsanitary methods of refuse collection where containers of limited capacity are preferred. Here's why: (1) The Dempster-Dumpmaster Detachable Containers always remain at the accumulation point. (2) Three sizes—1¼, 2 and 3 cu. yds. capacities—are available to meet every requirement for frequent pickup. (3) Containers may be placed in or outside of build-



WITH THE DEMPSTER-DUMPMSTER SYSTEM for collection of refuse in 6 to 15 cu. yd. containers and the new Dempster-Dumpmaster for collection in 1 1/4, 2 and 3 cu. yd. containers, your city can now further eliminate costly re-handling of refuse and unsanitary conditions caused by the use of inadequate conventional cans, open crates, boxes, etc. Like the larger capacity containers, those used with the Dempster-Dumpmaster are furnished with hinged lids, which are easily opened by user when deposits are made, then closed, sealing up the refuse—

eliminating fire hazards, odors, rats and the scattering of trash and rubbish by winds and scavengers. When filled, they are emptied mechanically direct into compaction body for maximum capacity hauling. The simple action of the Dempster-Dumpmaster is shown in Photos 1, 2, 3 and 4. It serves one detachable container after another. Casters may be supplied on any container for easy movement to and from pickup point. 1 1/2 cu. yd. open front container is available for alley pickup collection of residential refuse.



2



3

## Revolutionary Method of Refuse Collection regardless of size

ings—caster equipped 1 1/4 cu. yd. containers, for instance, pass through single doorways into office buildings, stores, cafeterias, etc. (4) Only one man, the driver, is required and he never has to leave operator's seat. (5) By picking up loaded refuse at front end of truck, driver has complete vision of the entire operation when Dempster-Dumpmaster is being used for collection of refuse from conventional cans in alleys, etc. (6) Hydraulically operated Dempster-Dumpmaster picks up each container and dumps refuse in the compaction type body for maximum capacity loads. (7) No equipment approaches the flexibility of the Dempster-Dumpmaster for general service, particularly in the smaller cities.

The Dempster-Dumpmaster is now available with compaction type body of 20 cu. yd. capacity, mounted on any make truck chassis of suitable size. Write us today for complete information. Dempster Brothers, Inc.

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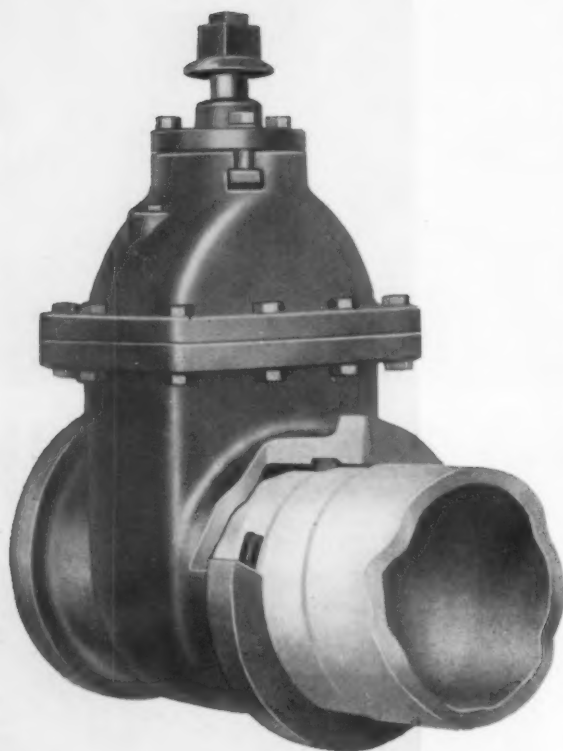


4

SEE US AT APWA BOOTHS A-1 & A-2

# Now Ring-Tite Joints

## for RENSSELAER VALVES



RENSSELAER VALVE  
WITH "O"-RING SEAL  
AND RING-TITE  
JOINT.



Rensselaer Valve Co. in cooperation with Johns-Manville has adapted Gate Valves and Hydrants to the Ring-Tite Joint, developed by Johns-Manville for Transite Pipe. The first experimental installation of Ring-Tite valves was made in July 1953 at Mattapoisett, Massachusetts.

### FAST AND SURE INSTALLATION

Rensselaer Ring-Tite Gate Valves and Fire Hydrants permit quick and simple installation with Transite Pipe. No special fittings are required and labor cost is low. Ring-Tite Bells provide tight, flexible joints.

During assembly, rings are inserted in the grooves, pipe ends are lubricated and the pipe is pulled in — sliding under the rings and slipping along until movement is stopped by shoulders on the pipe. A very simple puller is used and the job is accomplished quickly and with very little effort. At low pressures, the seal is obtained by radial compression of rubber rings. At higher pressures, rings are wedged in the grooves tighter by the pressure.

Rensselaer Gate Valves with Ring-Tite Ends are available in sizes 4" through 12" for Transite Pipe.

### RENSSELAER GATE VALVES

Rensselaer Double Disc Parallel Seat Gate Valves are built rugged and simple, designed to give positive seating action and long life and are easy to operate, are made of high quality materials and conform to A.W.W.A. specifications. Rensselaer Gate Valves are available with "O" Ring Seals or standard packing.

Ask for Bulletins B and C.

# Rensselaer VALVE CO. TROY, N. Y.

GATE VALVES • FIRE HYDRANTS • SQUARE BOTTOM VALVES • CHECK VALVES • AIR RELEASE VALVES

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for street sweepers



- No Capital Investment Required
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*World's Largest Producer of  
Power Sweepers for Cities and Industry  
Sold and serviced in all principal cities*

## SMALL TOWN BENEFITS PROVED IN HO-HO-KUS, NEW JERSEY!

In this borough of only about 700 dwellings, a single Wayne Sweeper has been in operation since 1952 without missing a single day in the street cleaning schedule. August Kempf, borough road department superintendent, writes: "It has exceeded our most optimistic expectations!"

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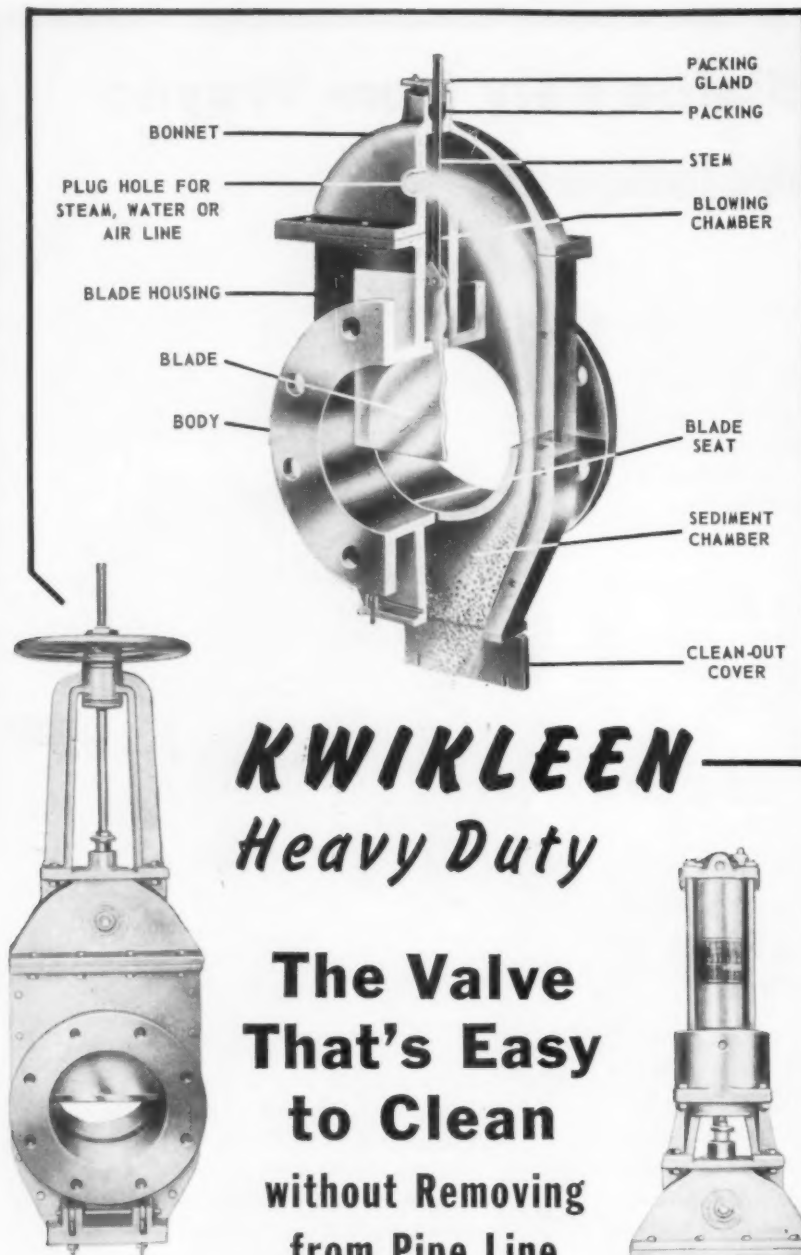
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**The Valve  
That's Easy  
to Clean  
without Removing  
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The ideal valve for sewage, debris, liquids or gases carrying high percentage of solids. Combines full flow area, minimum pressure drop, quick control and easy, quick cleaning, blowing or washing out, without dismantling.



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## LETTERS TO THE EDITOR

### FLUORESCENT LIGHTING

We, at Line Material, noted with particular interest, the article entitled "Fluorescent Lights Brighten River Rouge Streets," on page 86 of your August issue. Since we are one of the three major manufacturers of street lighting, we like to follow the acceptance of the different light sources throughout the country.

We were somewhat surprised to read, "River Rouge's lighting system is also the first major fluorescent installation in which the fixtures are

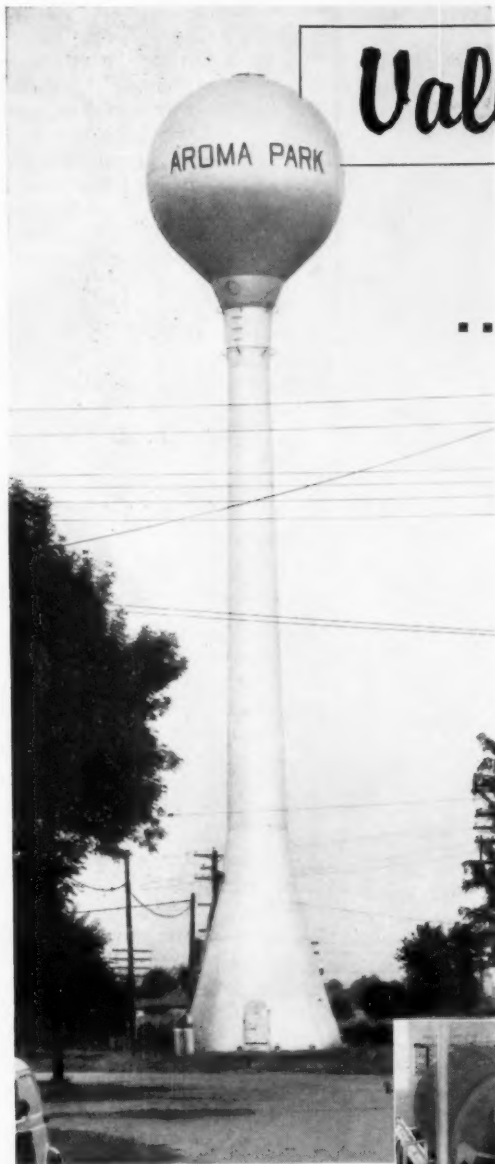


FLUORESCENT lights with fixtures tilted at 20° at Hopkins.

tilted upward to increase pavement brightness in the center of the street."

Line Material Company introduced the tilted fluorescent luminaire to the industry well over a year ago, with fluorescent luminaires at an angle of 15° above the horizontal. This installation was completed and energized in Atlantic, Iowa, in October 1954. Another installation using L-M's four-lamp fluorescent luminaires is at one of the municipal parking lots in Hopkins, Minnesota. The luminaires here are tilted upward, but these are at an angle of 20°.

In Hopkins only the luminaires in the parking lot are tilted, and the luminaires along the streets are installed horizontally. At the time of their energization in November of 1954, the 154 four-lamp fluorescent



# Values to Recognize

## ... Horton Watersphere ...

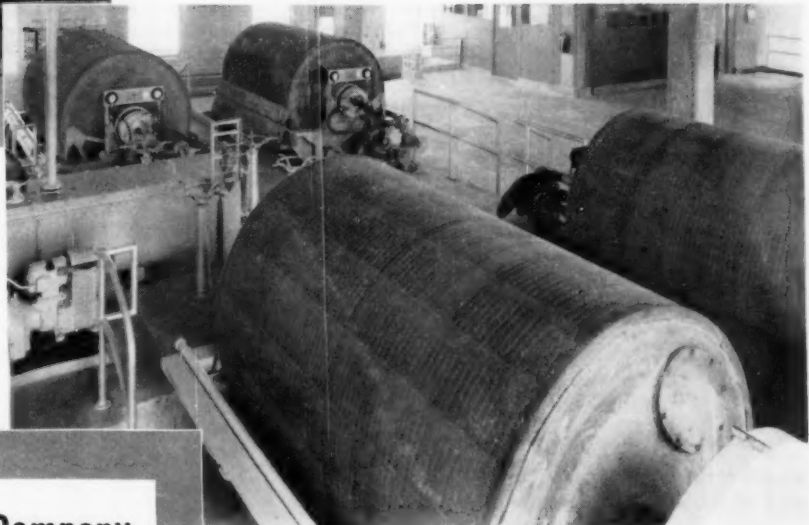
Here are some values that municipal and consulting engineers will be quick to recognize:

- (1) The Horton Watersphere®, a modern streamlined structure that provides a dependable gravity pressure water supply, striking appearance and a minimum surface area to maintain,
- (2) Conkey Sludge Filters, in use dewatering over two thousand tons of dry solids from sewage and industrial wastes at installations throughout the nation. There are other values at CB&I, including four completely equipped plants and experienced engineering, fabricating and erecting crews.

Solve your water distribution system and industrial wastes disposal problems by writing the nearest CB&I office.

## Conkey Sludge Filters

Above: 50,000-gal. Horton Watersphere built for Aroma Park, Illinois. The base of the Watersphere is used as a pump house.



Above: Conkey Sludge Filters designed for dewatering 225 tons of digested elutriated ferric chloride flocculated sewage sludge daily at the Little Miami Sewage Works, Cincinnati, Ohio.



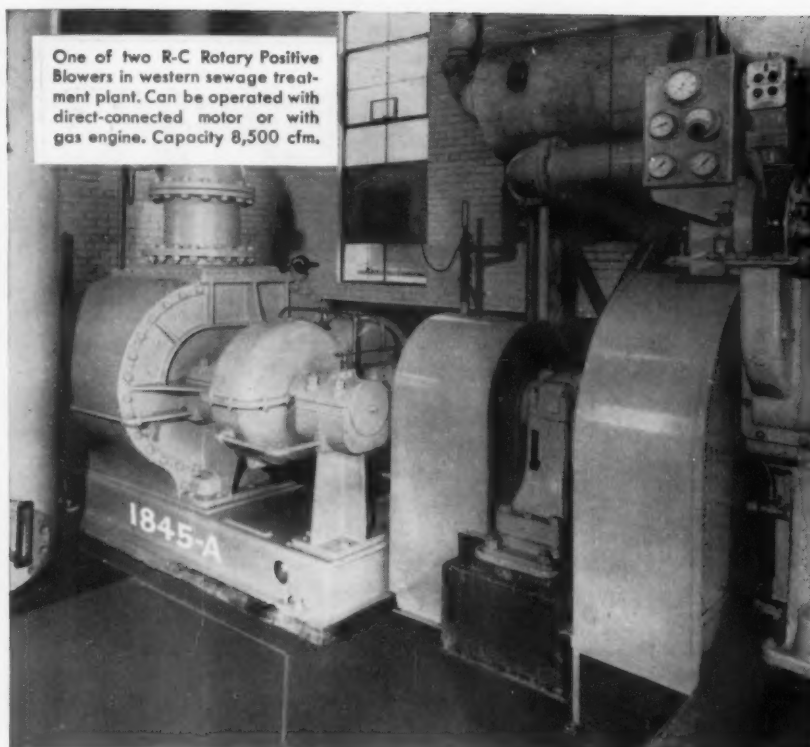
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Plants in  
BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

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One of two R-C Rotary Positive Blowers in western sewage treatment plant. Can be operated with direct-connected motor or with gas engine. Capacity 8,500 cfm.

## You can have DRIVE FLEXIBILITY with R-C BLOWERS



1. Accurate volume at required pressure
2. High efficiency—low operating cost
3. Low maintenance cost—low down time
4. Freedom from oil or oil vapor contamination

Check your present blowers and if they don't measure up, it may be an economy to replace them with modern R-C equipment.

In addition to the "BIG 4" advantages of Roots-Connersville Blowers for sewage treatment, another important factor is their adaptability to any modern drive. In the installation pictured, the plant manager can change at will from direct connected motor drive to gas engines, for greater operating economy when gas is available.

With capacities from 5 cfm to 50,000, R-C Rotary Positive equipment is used by more sewage treatment plants than any other make. Further, engineers can choose from the exclusive R-C *dual-ability* line either Rotary Positives or Centrifugal units (from 2,000 cfm to 100,000 cfm or higher) to match their specific needs.

Thus, in types, capacities and drives, R-C Blowers permit exact selection to the requirements of any plant, large or small. Ask for counsel and suggestions for new installations or replacements, or send for details in bulletin RB-154 on Rotary Positive and bulletin 120-B-14 on Centrifugal equipment.



# ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.  
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Roots-Connersville Blower (Canada) Ltd. • 629 Adelaide St. W., Toronto, Ont.

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luminaires in Hopkins, Minnesota, represented the largest fluorescent installation in the country. So it then was a "major" installation. Even with the increased acceptance of fluorescent street lighting, Hopkins should still remain among the ranks of "major" installations.

Though this information may be of little benefit to you now, you may, we hope, appreciate receiving the true facts. Please feel free at any time to call upon Line Material Company to supply you with any lighting installation stories, or any information about street lighting equipment.

L. A. Navarro,  
Technical Editor,  
Line Material Co.,  
Milwaukee, Wisc.

## THAT TICKLER FILE

"Setting up a Tickler File," the article in the August issue by Jephtha J. Carroll, is of interest. A suggestion may be of further help to young administrators. Twelve sheets of paper can be made into a calendar for scheduling the entire year's program of recurring items on a monthly basis. Also, the commonplace desk calendar can be very helpful and its potential is often overlooked.


To serve their purpose successfully tickler systems should not only remind a person of the date an item is due to be done, but also the date he must begin work on it. After that, all that remains to make them foolproof is a reminder to refer to them.

Edward H. Easley,  
University of Rochester,  
Rochester, N. Y.

## BOOKS IN BRIEF

### INDUSTRIAL WASTE TREATMENT

Here is a good book on industrial waste treatment, complete and up-to-date. Most of the text is devoted to a description of the operations and processes used to fit industrial waste for discharge into municipal sewer systems, but definitive treatment methods are also described fully. There are three chapters on criteria for pollution; one on pre-treatment and 13 on treatment methods. A final chapter gives data on the characteristics of specific wastes. In all, there are 24 chapters, 58 illustrations and 392 pages. References are to recent and valuable



**Atlanta doubles the life of  
traffic signs by switching to  
Alcoa® Aluminum**

When Atlanta used steel traffic signs, vandalism and weather cut life expectancy to as little as three years. Since the city's switch to Alcoa Aluminum, Assistant Traffic Engineer, Lamar Thomas, rates sign life at seven years and says it may go higher.

But this 200% gain in sign life is only part of Atlanta's savings. City Traffic Engineer, Karl A. Bevins, points out that because aluminum defies corrosion, sign backs need no costly painting.

Your Alcoa Distributor is ready to help you gain these same advantages. He stocks Alcoa Aluminum standard sign blanks in many shapes and sizes, along with aluminum sheet for shops that shear their own blanks. His complete line of Alcoa Aluminum Fasteners

assures trouble-free installations. Finished signs of Alcoa Aluminum are also available from leading traffic sign manufacturers. Call him today, or write: Aluminum Company of America, 1978-K Alcoa Building, Pittsburgh 19, Pennsylvania.



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to Aluminum  
Value**



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# Any Way You Look at it... Your Maintenance Dollar Goes Much Farther when You Use

## **AIRPLACO** CONCRETE GUNNING EQUIPMENT

SAVE  
TIME

SAVE  
MATERIALS

SAVE  
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Whatever your concrete repair and restoration problems, you can save money and stretch your maintenance budget when you have your own AIRPLACO Bondactor or Nucretor and your own permanent personnel doing the work. Designed to do the job faster, better and at a much lower cost, AIRPLACO equipment is fast becoming the standard with public works officials all over the country.

AIRPLACO concrete gunning equipment tops all other methods for street, sidewalk and curb repair; restoration of ditches, culverts and retaining walls; storm sewer repairs and many, many other uses.

AIRPLACO equipment is available in a range of sizes—from  $\frac{1}{2}$  cu. yd. per hour to 6 cu. yd. per hour of aggregate—a model and size to fit your needs and your budget.

Write today for more information on the AIRPLACO Bondactor, Mix Elvator or Nucretor and the name of your nearest distributor. Please state intended use.



CITY OF BALTIMORE uses AIRPLACO equipment—a Bondactor and a Mix Elvator—to restore 3,280 feet of granite dock frontage. Entire project completed in 20 days and at a saving of hundreds of dollars. The Bondactor is shown mounted on chassis of Mix Elvator.



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articles and publications. The author is C. Fred Gurnham, Prof. and Head of the Dep't. of Chemical Engineering, Michigan State University. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. \$9.50.

#### MOVING THE EARTH

This book is entitled "Moving the Earth, The Workbook of Excavation," by Herbert L. Nichols, Jr., and contains 1280 pages, 6 $\frac{5}{8}$  x 9 $\frac{1}{2}$ ; 1266 illustrations, glossary, index. Bound in Fabrikoid. Publication March 31, 1955, \$15.00. North Castle Books, 212 Bedford Road, Greenwich, Conn.

#### STABILIZATION OF BASES AND WEARING COURSES

This manual, SM-1, deals with the properties and design, types and methods of dense graded construction when calcium chloride is used. The principles and recommendations presented are the result of many years of field application and laboratory research on the subject. Copies free from the Calcium Chloride Institute, 909 Ring Building, Washington 6, D. C.

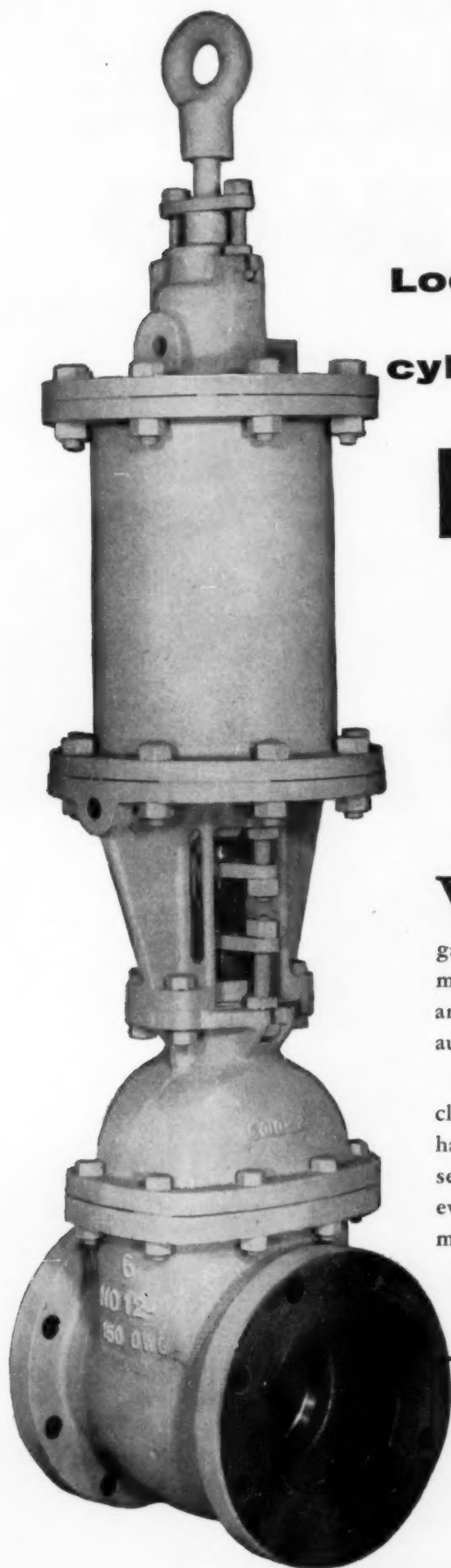
#### MAINTENANCE FOR UNPAVED ROADS

This 36-page booklet is intended to help maintenance supervisors and engineers obtain best results from the use of calcium chloride on unpaved roads. Copies free from Calcium Chloride Institute, 909 Ring Building, Washington 6, D. C.

#### ROCK DRILLERS HANDBOOK

This "Drillers Handbook on Rock", is one of the most comprehensive drilling manuals ever compiled. In this 68-page, pocket-size booklet, is a complete description of all common rocks, with data on hardness, texture, fracture and formation in detail. Readers are instructed how to judge the speeds with which various rocks can be drilled. A method by which the driller can establish a "point system" to figure drillability and drilling cost is also outlined. The Handbook contains 71 illustrations and 15 charts. Other features are a glossary of approximately 150 commonly used rock and mineral technical names and terms. Modern drilling equipment, ranging from light hand rock drills to large truck-mounted rotary air and mud drills, are illustrated and described. Copies at \$1.50 from the Rock Drill Division, Davey Compressor Co., Kent, Ohio.





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**cylinder-operated gate valve**

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**...AVOIDS TROUBLE**

**...CUTS MAINTENANCE**

**W**HERE frequent operation is required... especially in inaccessible locations... Darling cylinder-operated gate valves save time on each cycle of operation. The valve may be operated by air, oil or water. Movement is precise and completely controllable. Action can be either manual or automatic. Control can be either local or remote or both.

Darling's double disc gate valve principle assures tighter closing and longer, service-free life. The fully revolving discs have a wiping action that keeps seat faces clean. The discs seat in a different position with each cycle so that wear is evenly distributed. Available in a broad range of sizes and materials. Write for complete details.

**DARLING VALVE & MANUFACTURING CO.**

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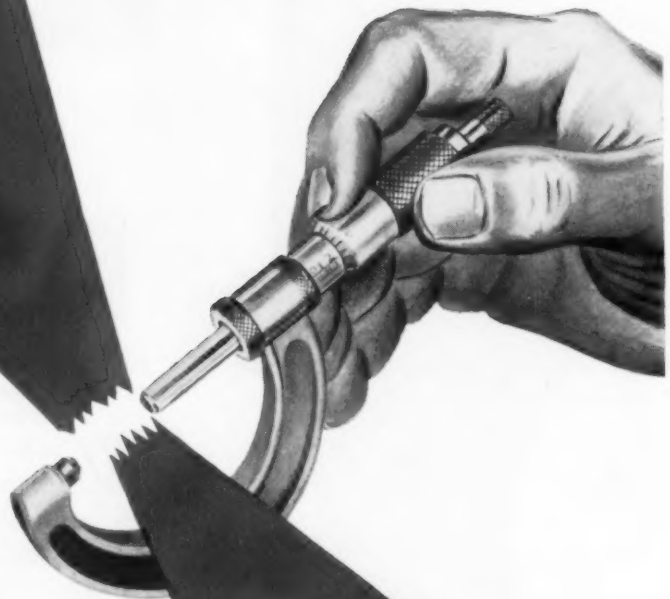
*Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario*

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**NEW SUPER "90" A W POWER GRADED**

# How big is a micron? How heavy a grain?

The micron is a measure of size—the grain a measure of weight—both minute compared with a pound, foot or inch, but they are the order of magnitude in the calculations of permissible stack emissions as defined by air pollution controls of approximately 350 cities. Nichols leads in economical and practical fly-ash and air pollution control equipment for municipal and industrial incineration.



## Nichols Monohearth

**Mechanically Stoked Refuse Incinerators**

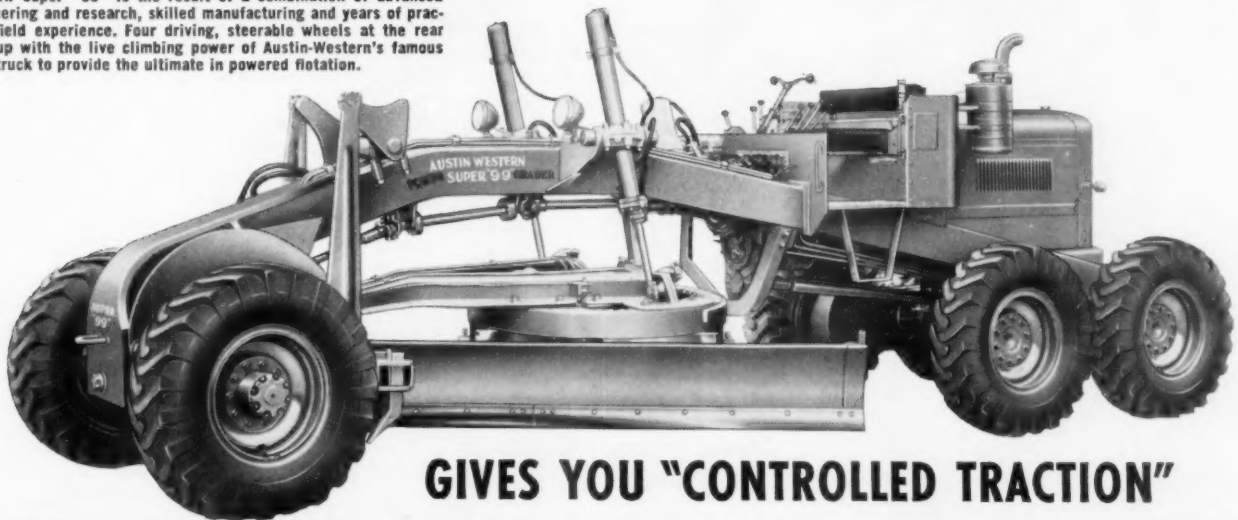
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... and Nichols Herreshoff multiple hearth dryer-incinerators for sewage sludge disposal

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# NEW SUPER "99" A-W POWER GRADER DRIVES AND STEERS ON ALL 6 WHEELS

The new Super "99" is the result of a combination of advanced engineering and research, skilled manufacturing and years of practical field experience. Four driving, steerable wheels at the rear team up with the live climbing power of Austin-Western's famous front truck to provide the ultimate in powered flotation.



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**MAXIMUM BLADE POWER PLUS TWICE THE MANEUVERABILITY**

Whatever the job . . . whatever the ground conditions . . . your best buy in its class is the complete Power Grader, the new, big Super "99." With exclusive All-Wheel Drive for 30% greater Power-at-the-Blade; exclusive All-Wheel Steer for 100% greater Maneuverability, and exclusive "swing that rear-end" Controlled Traction for moving more material, farther and faster, the new Super "99"

Power Grader with its six driving and steering wheels will outperform ordinary front steer motor graders, definitely and completely.



**Austin-Western**  
Power Graders • Motor Sweepers  
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**Construction Equipment Division**

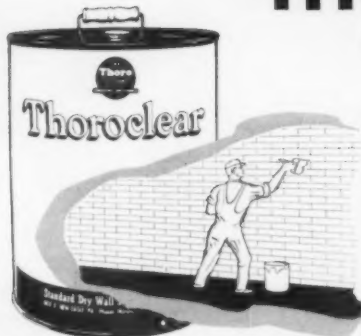
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## The THORO System of Masonry Protection

### THOROCLEAR

#### Invisible Water Repellent



Ask your dealer about this powerful silicone water repellent developed by years of research by General Electric Company and now produced by us for your protection. Ask for Circulars No. 30 and 31.

No change in color or texture of brick, limestone, sandstone, tile or stucco surfaces. Applied by brush or spray.

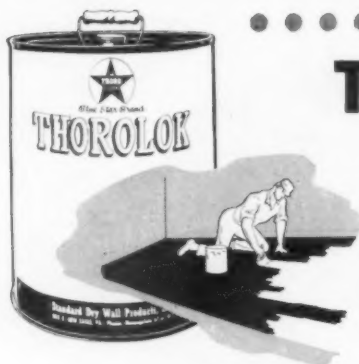
Keep water out of your masonry walls and protect interior plaster, paints and expensive furnishings.



### THORITE

#### 20 Minute Set Patching Compound

Repair those broken sills, steps, concrete floors, chimneys and other defective masonry! Ask for circular No. 20.



### THOROLOK NO. 100

Use it for your basement or factory floors. New, with special alkali resistant pigments. Ask for Color Card 32-C.

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for all types of  
masonry protection!

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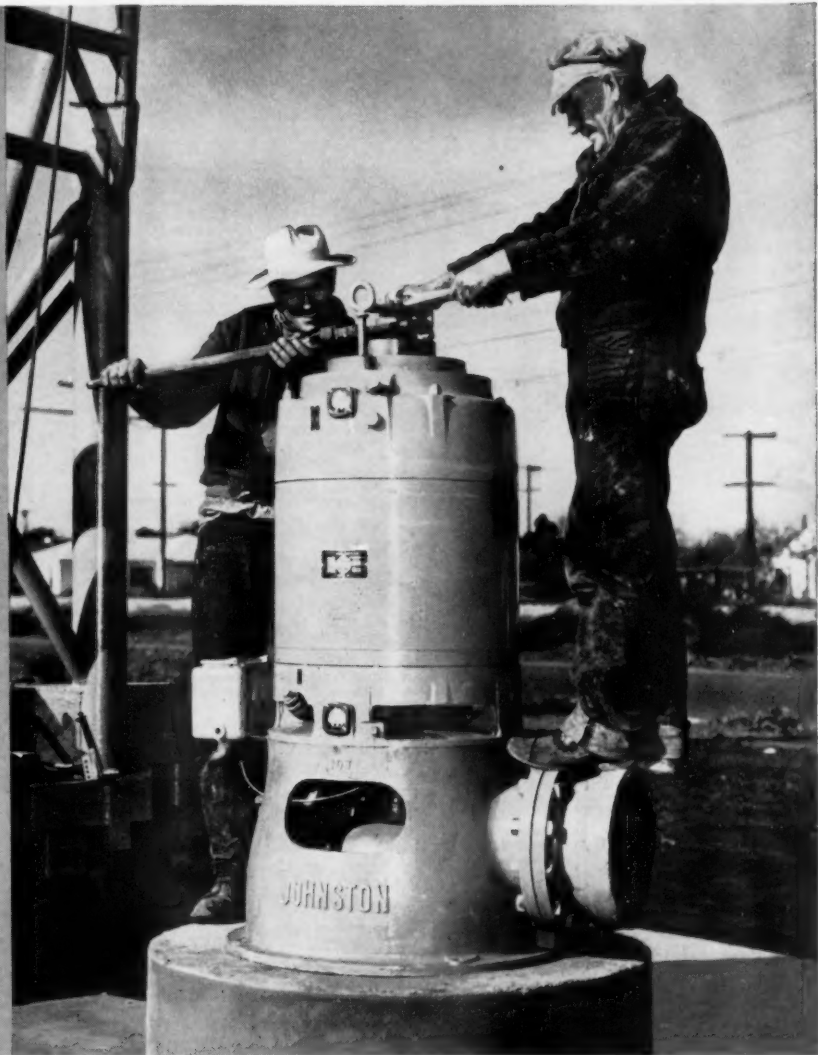
Kenneth S. Watson is Consultant, Water Management and Waste Control, for the General Electric Company, Schenectady, N. Y., a position he has held for the past 5 years. Prior to coming with General Electric, he was Assistant Director of the Ohio River Valley Water Sanitation Commission. Previous positions have included Chemical Engineer and Executive Secretary for the West Virginia Water Commission; four years in the United States Army including Company Commander in a Water Supply Battalion, Assistant Engineer and Water Supply Officer for a Tactical Corps, Commander of an Engineering Combat Battalion, and Trade and Industry Officer in Military Government for the city of Frankfurt, Germany. His present duties are to plan, organize and develop a company-wide program of water management and waste control and encourage the individual plants to participate fully in this program.

Mr. Watson was graduated from West Virginia University in 1934 with the degree of BS in ChE and in 1939 received his MS in ChE. Both degrees are with Sanitary Engineering options. He has association membership in the AIChE, AWWA, ACS and FISWA; and is active in the National Technical Task Committee on Industrial Wastes; the Federation of Sewage and Industrial Wastes Association's Committee on Industrial Wastes; the AIChE committee on Industrial Wastes Disposal; the Manufacturing Chemists Association Water Pollution Abatement Committee; and the New York Advisory Committees on Water and Air Pollution. He and Mrs. Watson have one son, Kenneth S. Watson II, now twelve years old.

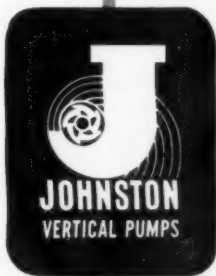
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are designed  
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...that they are designed by skilled engineers and built by master craftsmen to stand up under tough conditions. For nearly half a century, pump users have known that Johnston Pumps are economical to operate, easy to install and dependable in performance. Learn more about how Johnston can solve your pumping problems. Fill in and mail coupon today.



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PWM-105

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# EQUIPMENT DATA to Help Your PUBLIC WORKS PROGRAM

## NEW LISTINGS

### Data on Refractories

#### For Incinerator Furnaces

38. A data folder on super refractories for incinerator furnaces has been issued by The Carborundum Co., Refractories Division, Perth Amboy, New Jersey. Included is information on products, stoking and charging door linings, sidewall and ash pit linings and industrial incinerator linings. For your copy check the coupon today.

### To-day's Newest

#### Industrial Wheel Tractors

47. Be sure to investigate the Super 77 and Super 88 tractors offered by Oliver to give you better performance, smoother operation and easier to get at service check points. Full data on the many features from The Oliver Corp., 400 West Madison Street, Chicago 6, Illinois or check the coupon.

### Treatment of Trade

#### Wastes with Dolomitic Lime

57. Engineers who are charged with the responsibility of treating industrial trade wastes should get Bulletin No. 2 released by The Finishing Line Association of Ohio, 240 Huron Street, Toledo 4, Ohio. Complete information on the use of Dolomitic Lime in the treating of plating, pickling liquor and oil emulsion wastes is included. Write to-day or check the coupon.

### Complete Information on

#### Swimming Pool Filters and Supplies

58. A complete line of swimming pool filters and supplies, including chemicals, water testing equipment, ladders, rails, diving boards and stands, cleaning equipment and filter equipment is listed in catalog of the American Pool Co., Briarcliff, New York. Check the coupon for your copy.

### Important Information

#### On the Upkeep of Water Tanks

151. Complete information on water tank maintenance, inspection, survey, repairs and painting and a complete review of the dangers of water tank neglect is available in a catalog from the Pittsburg Tank & Tower Co., Pittsburg, Kansas, or by checking the handy coupon.

The engineering information in these helpful catalogs will aid you in your Engineering and Public Works programs. Just circle numbers you want on the coupon, sign and mail. This free Readers' Service is restricted to those actively engaged in the public works field.

### Continuous Volumetric Feeding Of Fluoride Compounds

65. A four-page color bulletin on accurate and continuous volumetric feeding of fluoride compounds has been issued by Omega Machine Co., 345 Harris Ave., Providence, R. I. In addition to describing the unit and its operation, the advantages of large hopper, positive hopper agitator, low power usage, visible and uniform feed and low power requirement are included. Get full data by checking the coupon.

### The Modern Approach to the Brush Problem

222. Eliminate your brush disposal problem by using an Asplundh Chipper. For complete information on what the Chipper can do, how it can save on costs, various types available and other outstanding features write to Asplundh Chipper Co., 505 York Road, Jenkintown, Pa., or check the coupon.

### Valuable Information

#### On Permutit's Precipitator

108. A well illustrated 20-page Bulletin, No. 2204 C, describing the many applications, principles of operation, design features, advantages, recommendations, flow diagrams and specifications of Permutit's Precipitator has been released by The Permutit Co., New York 36, N.Y. Chief uses are in water softening, reduction of alkalinity and the removal of turbidity, color, taste and odor. Check the coupon for your copy.

### Adjustable Coupling for

#### Installation of Water Meters and Valves

46. An adjustable coupling, Jasco, used in the installation of water meters, valves and various connections that require replacement

periodically is described fully in literature available from Jasco Products Co., 8102 Bonner Drive, Houston 17, Texas. This coupling can be used on water, oil, steam and is designed to hold high pressures and is manufactured in all sizes for the purpose intended. Check the handy coupon today.

### Sump Pumps for Wet Pit Installations

79. Designed in single or duplex units to elevate drainage or sewage from wet pits, sumps, basements and boiler pits. Sizes from 1½" to 3" for drainage free from solids. Sizes 3" to 14", non-clog type for unscreened drainage containing solids. For full information send for catalog to Economy Pumps, Inc., Div. of C. H. Wheeler Mfg. Co., 19th and Lehigh, Philadelphia 32, Pa., or check the handy coupon.

### Motor Units for Valves

#### Floorstands and Sluice Gates

82. Complete information on Chapman motor units is available in catalog No. 51 from The Chapman Valve Manufacturing Co., Indian Orchard, Mass. Advantages, installation and operation are fully described. For more details on these units check the coupon today.

## MORE LISTINGS ON PAGES 34 TO 48

### Valuable Booklet on

#### Mechanical Joint Pipe and Fittings

85. A new 32-page booklet entitled "Warren-Spun Mechanical Joint Pipe and Fittings" has been published by Warren Foundry & Pipe Corp., 55 Liberty St., New York 5, N. Y. The detailed method of installation, standard dimensions, thicknesses and weights and a table of standard sizes are included. Check the coupon for your copy.

### Verti-Line Primary

#### Water Supply Pumps

110. Vertical turbine pumps for industrial and municipal primary water supply are described in an 8-page bulletin No. 100. Sectional illustrations with enlarged views of special features of the products and detailed drawings of pumping and distribution systems are included. For more information write Layne & Bowler Pump Co., 2943 Vail Avenue, Los Angeles 22, California, or check the coupon.

### Data on Instrumentation

#### For Water Treatment Plants

120. Instrument control for water treatment plants is illustrated and described in Bulletin 90-241-10, issued by Fischer & Porter Co., Hatboro 35, Penna. Illustrations include a flow diagram showing the F & P system for operation of rapid filters by means of modern instrumentation. Operation of the filter table is described in detail. Other instruments described include standard, portable and automatic proportioning chlorinators, flow meters and residual chlorine analyzers. Check the coupon for your copy.

10-55

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on products and materials mentioned in this issue.  
Circle numbers below and mail today.

#### Booklets from pages 32 to 48

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#### New Products, pages 170 to 175

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## New Oliver Jet Trencher for OC-3 Loader hooks up or detaches in 90 seconds

### Exclusive 2-point hitch does the trick!

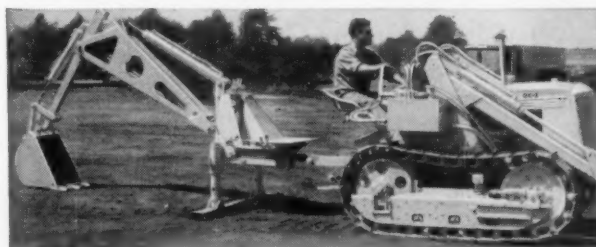
This new Jet Trencher is the perfect addition to the famous Oliver OC-3 Loader. It digs to 12 feet and lifts to 11½ feet—adds extra versatility without limiting tractor maneuverability or loader operation.

The exclusive hydraulic 2-point hitch makes hookup and removal a simple, one-man operation from the tractor seat. When the trencher is removed, the hitch holds the loader counterweight or quickly takes a number of handy attachments—scrapers, scarifiers, etc.

All new in design and construction, the Jet Trencher places all stress and strain on the trencher frame, not on the tractor. Its new mounting, offset to the side of the tractor, gives unmatched visibility and permits close parallel digging to walls, foundations. Full 180° boom swing gives straight side dumping.

Working from the loader hydraulic system, the Jet Trencher has powerful down pressure for digging

through tough soil. Hydraulic control gives smooth, cushioned operations and insures long-life, low-upkeep operation. See this new trencher and OC-3 Loader. Ask your Oliver Industrial Distributor for a demonstration.



Hydraulic 2-point hitch is adjusted to fit slots on sides of trencher as tractor is backed into position. Snap-on fittings connect hydraulic lines—seat is swung around and trencher is ready to operate. When not attached, trencher rests, as shown here, on stabilizer blade and bucket.

**THE OLIVER CORPORATION**

400 West Madison Street, Chicago 6, Illinois



a complete line of industrial wheel and crawler tractors

Now's the time to mail this month's Readers' Service card.

**NEW LISTINGS (Cont.)****Finest Line of Markers  
for Fine Line Marking**

165. Complete information on truck mounted highway markers, self-propelled line markers, all purpose line markers, and hand-propelled line markers is available from the M-B Corporation, New Holstein, Wis. Photographs and specifications of each type of line marker are included. For more, check the handy coupon.

**Full Information for All  
Tapping Situations**

172. Three bulletins are available from The A. P. Smith Mfg. Co., East Orange, New Jersey, describing the Smith mechanical joint tapping sleeve and valve, tapping machines and cut-in valve and sleeve. Advantages and complete description of the operation of the tools are included. Check the coupon today.

**Information on Bethlehem  
Steel Bridge Flooring**

181. Bridge flooring that provides a simple, maintenance-reducing flooring for bridges and overpasses is described fully in a bulletin released by The Bethlehem Steel Co., Bethlehem, Pa. Detailed drawings and specifications of the flooring and of the bridge curb and guard rail are included. For full information check the coupon today.

**Full Line of Weapons for  
Snow and Ice Battles**

268. Whether your snow problems are heavy or light, you'll find equipment for virtually all your needs among the plows and spreaders offered by Good Roads Machinery Corp., Minerva, Ohio. The "Champion Line" of Vee plows and one way and reversible plows with safety blade trip will handle snow removal; for chlorides and abrasives spreading there are five "Jet Line" spreader models and the 4-U towed spreader. Further details available by checking the coupon.

**A Streamlined Housing  
for Filter Control System**

200. The Pneumaster Console provides a factory assembled unit that provides accuracy and sensitivity obtained by use of precision indicating gauges, easy installation, minimum maintenance and other advantages. For further information write to Builders-Providence, Inc., 345 Harris Ave., Providence, R. I., or check the coupon.

**Booklet Helps Design of  
Custom-Engineered Steel Buildings**

271. Custom-engineered Butler steel buildings are available in every size, type and design to meet your building needs. In a helpful 32-page booklet you will find details on several basic designs and an unlimited variety of door, window and interior treatments; answers to your questions on construction and erection; and many illustrations of typical uses. Use the coupon or write to Butler Mfg. Co., Kansas City, Mo.

**New Line  
of Steel Buildings**

261. A photo catalog highlighting each of the features of the new tapered steel buildings is now available from the Steelcraft Mfg. Co., Rosslyn, Ohio. An important feature of the Tapered Frame is the superimposed fastening system which speeds up the application of the covering of the framework. For full details check the coupon.

**Complete Data on Highway  
Guard Rail**

237. A two-color catalog showing the application and use of Rheem-beam guard rail on highways, freeways and bridges and containing data on load deflection, elasticity and joint and tensile strength characteristics is available from Rheem Automotive Co., P. O. Box 2475, Terminal Annex, Los Angeles 54, Calif. or by checking the coupon.

**General Specifications  
for Refuse and Garbage Trailers**

251. Two bulletins, one on the Pak-Mor 38

c.y. tandem axle trailer unit and the other on the Pak-Mor 32 C. Y. trailer for use with Model GRD Dempster are available from Pak-Mor Manufacturing Co., P. O. Box 6147, Loop 13 & Roosevelt Ave., San Antonio, Texas. General specifications, power train, operating procedures, maintenance and lubrication and other helpful information are included. Check the coupon today.

**Complete Information and  
Installation Data on Clay Pipe**

225. A fully illustrated bulletin containing complete data on vitrified clay pipe with pre-assembled Tylox flexible couplings has just been released by Universal Sewer Pipe Corporation, 1500 Union Commerce Building, Cleveland 14, Ohio. Complete information on Universal's rubber, neoprene and polyvinyl chloride resin types of Tylox couplings is included. Check the coupon today.

**For Prompt Service  
Use The Coupon****Dependable Engines for  
Sewage Treatment Plants**

227. Climax 8 cylinder V-Type sewage gas engines and 12 cylinder V-Type sewage gas and gasoline engines are fully described in literature available from Climax Engine and Pump Mfg. Co., 208 South La Salle St., Chicago 4, Illinois. For full details of the reliability and economy of operation of these engines and other power plants check the handy coupon today.

**Catch Basins Cleaned  
With Hydraulic Excavator**

272. Cleaning catch basins is one of the many jobs made easier with the versatile Pippin Excavator, which features complete hydraulic control for fast, inexpensive operation. Get all the facts on this useful machine—you'll see how it can be kept in continuous use on a wide variety of work. Write Pippin Construction Equipment, Inc., White River Junction, Vermont, or check the coupon.

# NEW Littleford-Clarkmoore Asphalt Road Heater-Planer Heats and Planes in one continuous operation!

engineered unit for  
heating and planing  
bituminous roads,  
streets and  
runways

No other unit like it! This ingenious new machine—with one man at the controls, and in one continuous operation—heats and planes off high crowns, corrugations, eliminates troughs and ruts. Performs these and many other related operations as slowly as 1-ft. per minute, or as rapidly as 35-ft. per minute. For complete information send for bulletin 18.



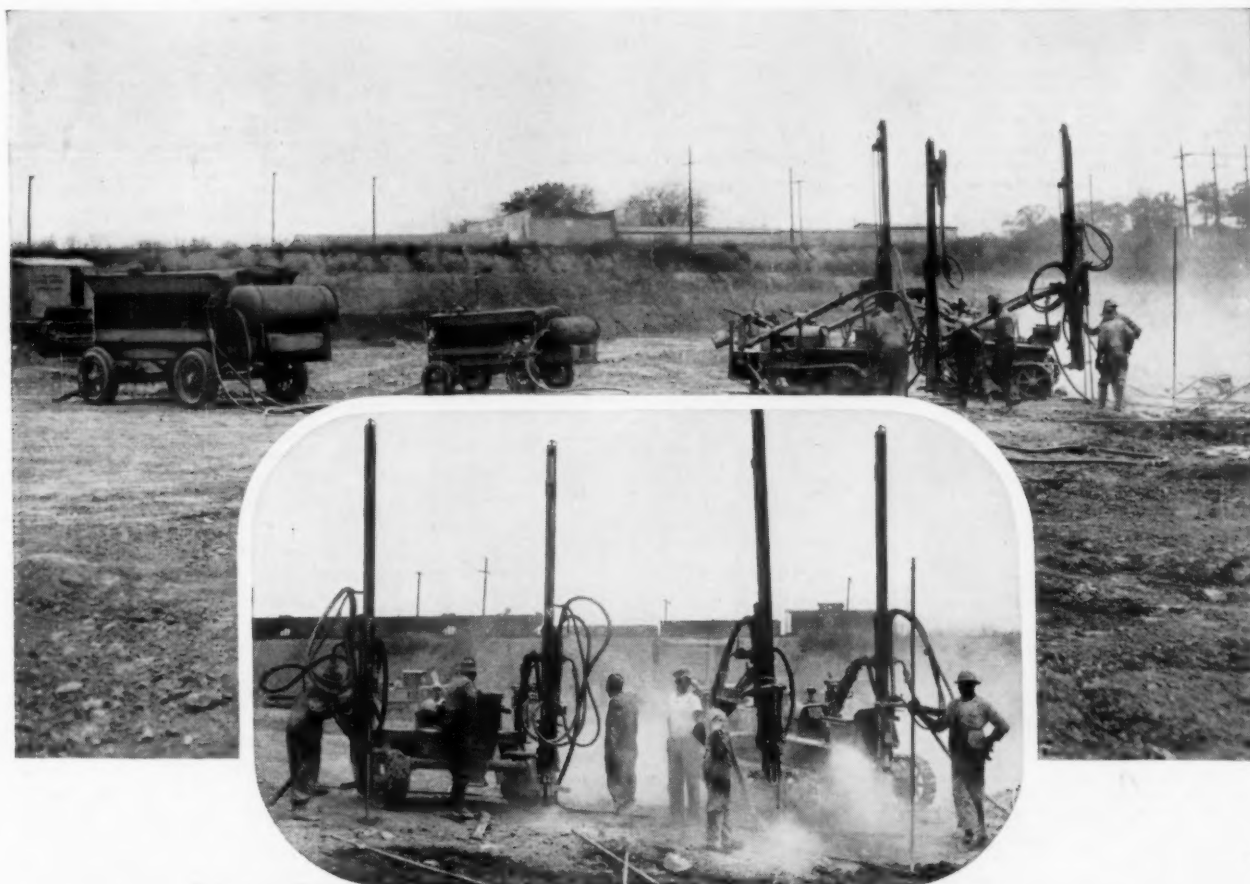
Send today for  
Heater-Planer  
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**LITTLEFORD**

LITTLEFORD BROS., INC.  
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## High Speed Sewage Disposal Team

### Le Roi Compressors and Cleveland T-286 Mobile Drill Rigs provide flying start for Alabama project

Ordinarily you wouldn't think that air compressors and rock drills had anything to do with sewage disposal plants.


But this plant had its origin in solid bed rock — and the contractor on the job used Le Roi portables and Cleveland Mobile Drill Rigs to solve the situation.

The portables were Le Roi 600's. They were selected for their dependability and economy — which they proved by supplying 600 cfm of air — day in and day out.

The Cleveland T-286 Mobile Drill Rigs further cut costs. Basically the T-286 rig consists of a 25-hp

tractor with two Cleveland patented air feeds, 4" drifters, and air-motor booms mounted on a specially-constructed front-end base. The booms swing in a 220 degree arc so that you can get any hole pattern you want. Because the T-286 gives you faster set-ups, better hole spacing, greater footage, faster drilling, greater mobility—because you can drive it anywhere and get better fragmentation—you get lower costs.

You get the whole story on Le Roi Portables and Cleveland T-286 Drill Rigs from our literature. Just write for your copies.

**LE ROI**  Division of Westinghouse Air Brake Co.

C-158

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### Trickling Filters Built with Filter Blocks

424. A 4-page catalog describing the "Translot" filter blocks which have slots running completely across the block, providing maximum ventilation and maximum drainage, is available from Texas Vitrified Pipe Co., Mineral Wells, Texas. These blocks are made in standard lengths and assure absolute resistance to acids, alkalies and gases. Check the coupon today.

### Valuable Booklet on Sewage Treatment Mechanisms

430. An illustrated Booklet #117 is available from Process Engineers Inc., 420 Peninsular Avenue, San Mateo, California. Describing the Oxidator, Flotator and Flotator-Clarifier for sewage treatment and municipal and industrial waste. Specifications, installation and operation procedures are included. Check the coupon today for your copy.

## WATER WORKS

### Data on Cutting-In Valves, Repair Sleeves and Accessories

33. A variety of Clow products for installation and repair of cast iron pipe lines including the Eddy cutting-in valve and sleeve, split sleeves for pipe repair, test plugs, valve boxes, Strickler pipe cutters and other fittings and accessories are featured in literature available from James B. Clow & Sons, Inc., Box 6600-A, Chicago 80, Ill. Check the coupon.

### Technical Data on Fluorides And Other Chemicals

48. Technical data on fluorides and other chemicals will be found in a comprehensive booklet issued by Blockson Chemical Co., Joliet, Ill. This helpful 60-page booklet includes a great deal of general information of value to water works men. Get a copy by checking the coupon.

### Elevated Tanks and Other Storage Facilities

32. How engineers' designs and standard AWWA specifications are followed for fabrications described in color illustrated booklet. Address the Darby Corp., Kansas City, Kans., or use the handy coupon.

### Meter Features That Help Make Water Works Profitable

59. Simple design, accuracy and long life, moderate first cost and inexpensive maintenance are features of American water meters described in Bulletin No. 55 of the Buffalo Meter Co., 2917 Main St., Buffalo 14, N. Y. Be sure you have this informative booklet which gives the details of American meter design and construction plus full data on sizes, capacities and dimensions. Get your copy by checking the coupon.

### Dependable Source

#### For All Chlorine Products

66. Get latest data on Jones chlorine service for liquid chlorine, calcium hypochlorite and sodium hypochlorite packaged in lots best suited for your needs. Five strategic locations serve all parts of the country. Check the coupon or write John Wiley Jones Co., Caledonia, N. Y.

### What You Should Know About Pipe Detectors

94. A new, up-to-date operating manual for pipe detecting instruments has been made available by the Detetron Corp., 5528 Vineyard Ave., No. Hollywood, Calif. Although written chiefly for the Detetron Model 505, it contains operating hints and other information useful with any make pipe detector. To get a copy just check the coupon.

### Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves are contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., Eliot Street, Fairfield Conn.

### Helpful Data on Water Works Products

49. A completely new catalog covering the entire line of water distribution and service products offered by the Mueller Company, of Decatur Ill., is now available to engineers and water works superintendents. The 328-page catalog features an easy-to-use sectional indexing arrangement to facilitate quick reference to any of the hundreds of products listed. A large section of useful engineering information is included. Check the coupon today.

### How to Make Better Sewer Pipe Joints

37. How to make a better sewer pipe joint of cement-tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston Co., Dept. P.W., Adams, Mass.

### Specs for Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

### Vertical Turbine Pumps For Municipal Water Supply

121. Engineering data on vertical turbine pumps for deep or shallow well operation in capacities ranging from 50 to 10,000 gallons per minute, oil or water lubricated, are covered in a booklet issued by Worthington Corp., Vertical Turbine Division, Succasunna, N. J. Check the coupon today for this helpful information.

### Engineering Data on Diatomite Filters

139. Get complete data on the Sparkler model SC-J diatomite slurry feed filter for swimming pools from the Sparkler Mfg. Co., Mundelein, Ill. Check the coupon for full information including table of filter sizes and capacities, space required and filter operation.



**Koehring**  
**1/2-yard hoe**  
**DIGS**  
**17 3/4- FEET**  
**DEEP**  
**31 IN. WIDE**

With long, deep reach and 8'-9" dump clearance, Koehring 1/2-yard 205 hoe delivers big output on basements, footings, water and gas mains, storm sewers and other below-grade digging. Powerful cable crowd, fast line and swing speeds maintain big-yardage production. Heavy-

duty box-section boom and dipper arm resist side-sway. Close-coupled dipper pulls up tight to boom, avoids spillage. This 205 converts to 1/2-yard shovel, 1/2 to 3/4-yard clamshell or dragline, 10-ton crane. Also available on truck mounting (15-ton lift capacity).

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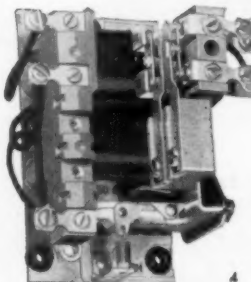
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The original—pioneered by B/W in 1933. No floats! No moving parts in liquid. Literature describes relays and starters, automatic starter and relay combinations, multiple pump controls, special controls and panels and many application diagrams.

Controls not affected by pressures, temperatures, acids or caustics. Remote control if desired. Ice free electrodes where necessary.

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2224 E. Maple Road, Birmingham, Mich.



## Ever Have a "Lights On" Celebration in Your City?

A "Lights On" celebration is a real community occasion. Often an entire town, thousands strong, turns out to see a public official switch on new street lights for the first time.

Why?

One big reason, of course, is the carnival atmosphere. Usually there's a parade, gaily decorated floats, a band or drum and bugle corps, and fireworks. Often the winner of a "parade queen" beauty contest reigns over the fun. Maybe there's a street dance or community "feed" right on Main Street itself.

But there's always a more important reason underlying all this public interest: people *want*, and appreci-

ate, good street lighting. They know they prefer to shop along well-lighted streets. They know they're safer when walking or driving along well-lighted streets. They come to a turn-on ceremony which they know will make their city's lighting compare favorably with neighboring communities.

In short, good street lighting comes to be a bright, visible symbol of the services the people expect—and get—from progressive municipal officials.

Why not talk over your city's street lighting with your local electric utility? You'll find them glad to help you in arriving at planned, practical solutions to your street lighting problems!

**"OUT OF DARKNESS,"** a new, dramatic film story of how one community met its street lighting problems, is now available to civic groups, community service organizations, etc. This 16-mm, sound, black and white movie runs 26 minutes. Borrow a print of "Out of Darkness" from your nearest G-E Apparatus Sales Office.

Section D455-1  
Outdoor Lighting Department, General Electric Company  
1400 Western Avenue, West Lynn 3, Massachusetts  
Please send me a free copy of the 24-page bulletin, "Light The Way to A Better Community."

Name.....

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City.....State.....

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Thousands use our Readers' Service card to keep up to date . . . do you?

### Reference Catalog for Valves, Fittings and Hydrants

125. Complete data on gate valves for all services, operating accessories, check valves, fire hydrants and related specialties plus a reference section of useful engineering data is contained in Catalog H-1 issued by Rensselaer Valve Co., Troy, N. Y. All engineers who specify valves, fittings, and hydrants should have this valuable catalog for ready reference. Check the coupon.

### Are You Ready Now To Make Main Repairs?

214. Broken water main can quickly be repaired when you have "Skinner-Seal" Split Coupling Clamps on hand. Leaky bell and spigot joints are made lastingly tight with Skinner-Seal Bell Joint Clamps. Get Skinner Catalog GW now—this handsome 48-page book shows how to make every type of pipe repair and covers a complete line of clamps to do the job quickly and easily. Just check the handy coupon for your copy.

### Locate Mains, Services and Leaks Without Digging

166. An 8-page booklet tells how to use the Fisher "M-Scope" to locate buried pipes, cables, valves, manhole covers, conductive and non-conductive sewer pipes and septic tanks by electronic means. Dry battery operated. Only one man is needed for operation. Get data from Fisher Research Laboratory, Inc., 19 University Ave., Palo Alto, Calif., by checking the coupon.

### What You Should Know About The Centrline Process

197. The Centrline method for cement mortar lining water mains 16" thru 144" in place to stop leaks, prevent corrosion, increase carrying capacity and decrease pumping costs is fully described in a handsome booklet issued by the Centrline Corp., 140 Cedar St., New York 6, N. Y. Many illustrations and typical case histories show the operation and economies of this process. The Tate process for lining smaller mains is also covered. Check coupon for your copy.

### What You Should Know About Turbine Pumps

167. In a colorful bulletin titled "Water Where You Want It . . . When You Want It" the Johnston Pump Co., Bin "K", Pasadena 8, Calif., gives details on turbine pumps with semi-open or closed impellers; oil or water lubrication; and adaptations for any power source or combination thereof. Get your copy of Bulletin 1015 by checking the coupon.

### All-Electric Floatless Liquid Level Control

174. Description of operating principles and application of B/W controls show the simplicity and many uses of these all-electric, floatless devices. Get latest bulletins for engineering data, diagrams of typical installations and details of component parts. Check the coupon or write B/W Controller Corp., Dept PW, Birmingham, Mich.

### Helpful Valve Catalog For Engineers

236. For complete descriptions of Darling double disc, parallel seat gate valves be sure to get Bulletin 5403 issued by Darling Valve & Mfg. Co., Williamsport, Pa. Construction details covering all valve parts and accessories are helpful for specification writers. Check the coupon for your copy.

### Explaining the Water Diaphragm Principle of Chlorinator Operation

243. The features, operation and benefits of the water diaphragm principle of chlorinator operation are fully described and illustrated in Publication TA-1026-C-1 recently published by Wallace & Tiernan Inc., Belleville 9, N. J. This helpful publication is yours for merely checking the coupon.

### Attractive Bulletin Features Large Elevated Tanks

252. In a 24-page booklet, "Horton Elevated Steel Tanks of Large Capacity," Chicago Bridge & Iron Co., Chicago 4, Ill., describes the advantages of using large elevated steel tanks to provide gravity pressure in municipal water systems. Detailed information on radial-cone tanks of 500,000 to 3,000,000-gal. capacity and Hortonspherical tanks of 1,000,000 to 3,000,000 gal. is included in this really handsome bulletin. Check coupon for your copy.

### Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in convenient booklets offered with the compliments of U. S. Pipe and Foundry Co., Birmingham 2, Ala. Get your copy by checking the coupon.

### Helpful Data on Sluice Gates

286. In a well-organized 170-page catalog you will find complete engineering and design data on Pekrul sluice gates, headgates, automatic flap gates, lifts and accessories. Pertinent data on models and sizes for virtually every application will be found in this publication. This catalog, PK 55, can be had by applicant writing on business letterhead to Pekrul Gate Div., Morse Bros. Machinery Co., Denver 1, Colo.

### Diesel Engines For Municipal Power Needs

359. Dependable power for water supply or flood control pumping stations, stationary or portable electric plants and many other municipal needs can be provided by engines described in literature of the Enterprise Engine & Machinery Co., 18th & Florida Sts., San Francisco 10, Calif. Get latest data by checking the coupon.

### All About Centrifugal Pumps

361. Where pumping performance counts you want to check your specifications carefully. Investigate the features of Fairbanks-Morse centrifugals. Use coupon or write to Fairbanks, Morse & Co., Dept. P. W., Chicago 5, Ill.

### Book Tells How to Control Algae

371. Details on the control of various microscopic organisms frequently found in water supplies are furnished in a 44-page booklet offered by Phelps Dodge Refining Co., 40 Wall St., New York 5, N. Y. Check the coupon for your copy.

*Although Grote tries to avoid superlatives,  
actual road and laboratory tests prove . . .*

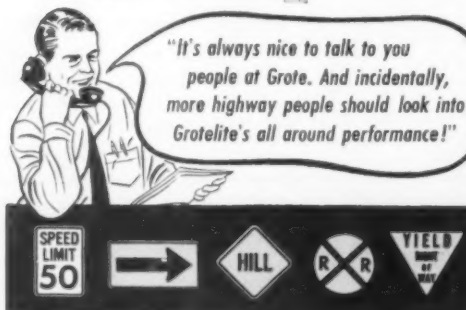


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**is seen Farther,  
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**PROVIDES MAXIMUM SIGN-TO-CAR WARNING!**

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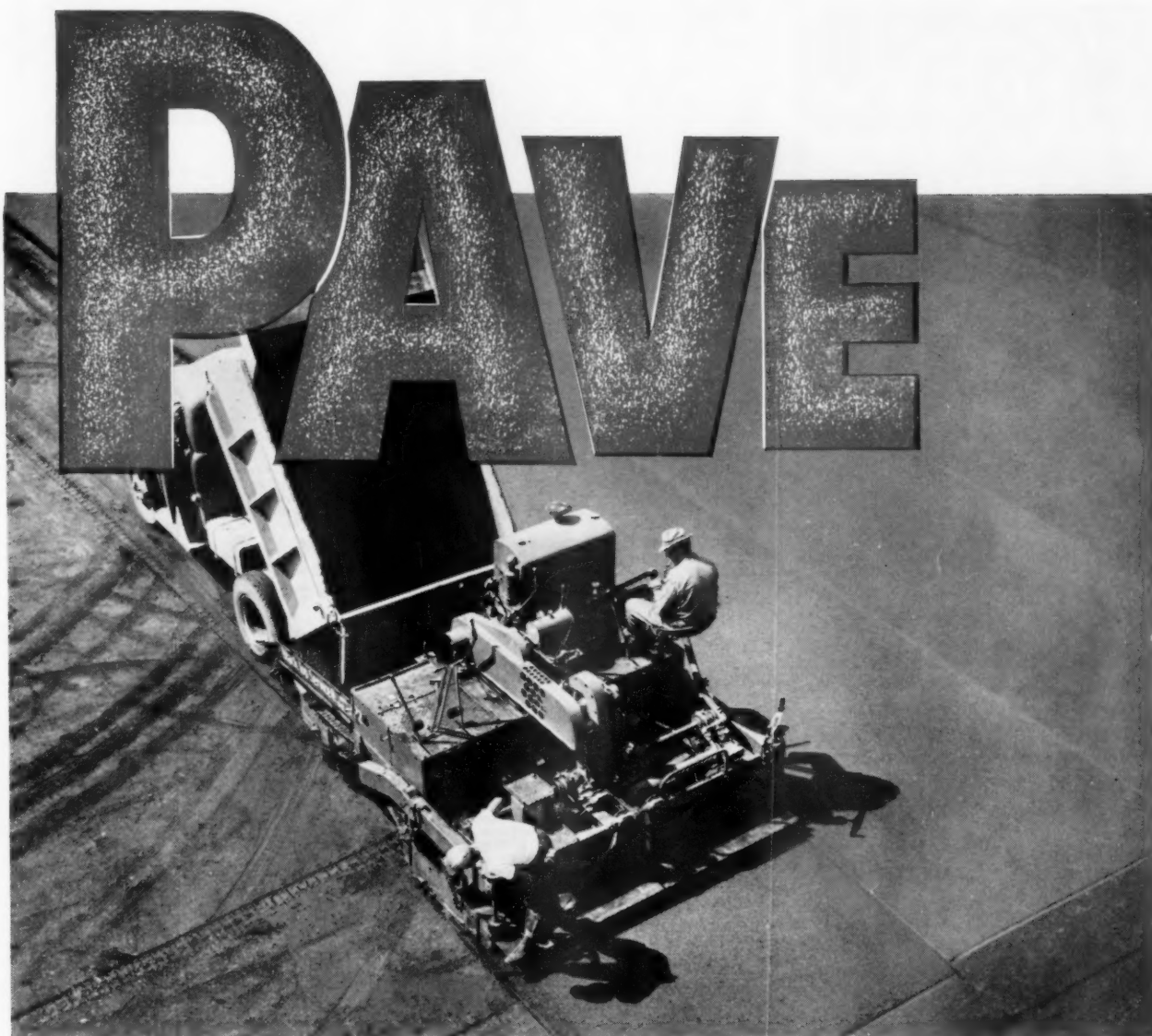
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**PAVE** with any bituminous mix—hot or cold—with the world's most widely accepted bituminous paver. No other machine or method will lay bituminous mix as quickly, perfectly or economically.

**PAVE** smooth riding surfaces, even over irregular bases. Automatic leveling increases or decreases the thickness of the mat to compensate for depressions or bumps in the existing surface.

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# Barber-Greene

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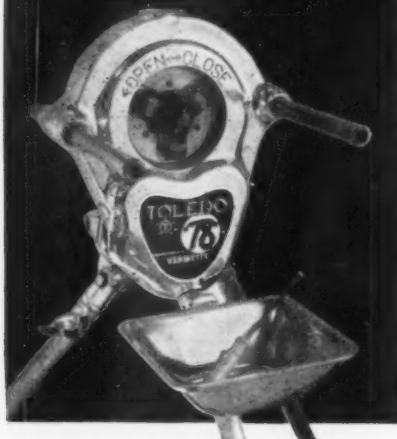
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**POWER**  
**DRIVE**



- ★ **WEIGHS ONLY 75 POUNDS**  
A real heavy-duty, lightweight
- ★ **RAPID, POSITIVE CHUCKING**  
- Grips like a pipe wrench—self centering
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The most advanced and versatile machine on the market
- ★ **BETTER BUILT TO LAST LONGER**  
No belts — sturdy — powerful

A time proved, PORTABLE power drive providing effort-less cutting, threading and reaming of pipe and conduit . . . a worthy addition to "TOLEDO's" well known line of quality pipe tools. Fully guaranteed. Handles up to 2" sizes . . . grips, tightens and centers pipe automatically, forward or reverse. It's the lightest portable power drive of its kind. And remember . . . if it bears the "TOLEDO" label . . . you know it's a dependable product.

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**TOLEDO PIPE THREADING  
 MACHINE COMPANY**  
 TOLEDO 4, OHIO



**Portable Sump Pump  
 Needs No Priming**

324. The BJ Pneumatic Sponge Pump, a self-contained air-powered unit, is built for heavy duty dewatering use on all construction jobs. Full details on this lightweight portable sump pump are contained in Bulletin No. 543-3-900, available from Byron Jackson Co., Box 2017, Terminal Annex, Los Angeles 54, Calif., or by checking the coupon.

**Engineering Data on Equipment for  
 Municipal Water Conditioning**

347. For information on the design and operation of many types of water treatment plant equipment, including the Graver Reactivator, pressure filters, iron removal installations, zeolite softening and water conditioning for swimming pools get Bulletin WC-113 from Graver Water Conditioning Co., 216 West 14th St., New York 11, N. Y. Check the coupon.

**Modern Filtration of  
 Swimming Pool Water**

351. Latest data on filtration systems for swimming pools of 50,000 gallon capacity and over is presented in 24-page bulletin No. 625 by R. P. Adams Co., Inc., 225 East Park Drive, Buffalo 17, N. Y. Design and operating data are provided, together with material to assist you in choosing the right filter for your pool. Check the coupon for your copy of this helpful bulletin.

**How to Clean and  
 Develop Water Wells**

375. The use of Weltone, which combines the cleaning power of Calgon with disinfecting and other chemicals in a safe, highly soluble powder is described in an interesting and informative booklet. For your copy of this descriptive literature write Calgon, Inc. Hagan Bldg., Pittsburgh 30, Pa. or check the coupon.

**Restoration and Protection  
 Of Concrete Structures**

385. A "How to Do It" bulletin describing the Thoro System for repair and sealing interior and exterior masonry surfaces is available from Standard Dry Wall Products, Inc., New Eagle, Pa. The treatment for every water problem is presented in illustrated case histories in this useful publication. Check the coupon for your copy.

**Cleaning and Relining  
 Water Pipe the Easy Way**

397. Complete facilities for relining cast iron or steel water pipe lines in place from 4" to 144" in diameter, with both the Tate process and the Centriline process offered by Pipe Linings, Inc., 2414 E. 223rd St., Wilmington, Calif. For full information on cleaning and relining pipe with only momentary interruption of service, check the coupon.

**Air Release Valves  
 For Water, Sewage and Industrial Use**

415. A colorful 8-page Bulletin No. 1204 is offered by the Simplex Valve and Meter Company, 7 East Orange Street, Lancaster, Pa., describing the functions of their automatic air release valves. Listed in the bulletin is information on essential requirements, methods of installation, operation, construction, uses, weights and dimensions. For your copy, check the coupon.

**Helpful Engineering Data  
 on Cast Iron Pipe**

422. Complete data on McWane Super-DeLavaud centrifugally cast pipe with bell and spigot or mechanical joints is contained in Bulletin WP-54, issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala. Size range includes 2" through 12" diameters, 18 feet long. Check the coupon for your copy.

**Jeffrey Traveling  
 Water Screen**

431. Information has just been released on the Jeffrey traveling water screens by the Jeffrey Manufacturing Co., Columbus 16, Ohio. These screens are designed for positive removal of floating debris and suspended matter from power station and water treatment plant influent. Each traveling panel is made up of a fine mesh wire screen basket and as each panel in its upward travel carries refuse from the

channel, it is thoroughly washed off by means of a high pressure water spray directed through the screen from the downstream side of the basket. For more information check the handy coupon for Bulletin No. 885.

**What You Should Know  
 About Hypochlorination**

395. "Hypochlorination of Water" is the name of an informative publication issued by Olin Mathieson Chemical Corp., Industrial Chemicals Div., Baltimore 3, Md. In it there is a discussion of chlorination theory, practice and equipment; control of algae, tastes and odors; and laboratory testing. Check the coupon for this interesting literature.

**STREET LIGHTING AND  
 TRAFFIC CONTROL**

**Get Full Data  
 On the Radar Speed Meter**

22. Accurate readings of vehicle speeds, with direct indications in miles per hour and a graphic recorder for permanent record are available by use of the Electro-Matic Radar speed meter, a product of Automatic Signal Division, Eastern Industries, Inc., Norwalk, Conn. For full data on this device, just check the coupon.

**Investigate These  
 Street Lighting Standards**

54. You can get complete data on Kerrigan factory-built "Weldforged" street lighting standards, brackets and mast arms by using the handy coupon. Check these strong, well designed, inexpensive steel standards for practical street and highway lighting. Handsome 26-page folder includes data sheets on floodlighting and area lighting applications. Kerrigan Iron Works, 1033 Herman St., Nashville, Tenn.

**Convenient Data on  
 Traffic Signs and Markers**

126. A complete line of traffic control devices, including stop signs, warning, signs, regulatory signs and danger signals is presented in the fully-illustrated catalog of the Grote Mfg. Co., Bellevue, Ky. Helpful excerpts from the "Manual on Uniform Traffic Control Devices for Streets and Highways" are included. Get a copy by checking the coupon.

**Street Lighting Application Curve  
 Eliminates Calculations**

257. An easy-to-use chart from which illumination level, spacing and proper mounting height can be determined has been prepared by the Illuminating Engineering Laboratory, General Electric Co., West Lynn 3, Mass. For a copy of the chart and instructions on its use check the handy coupon.

**Latest Data on Standards  
 For Traffic Control Signals**

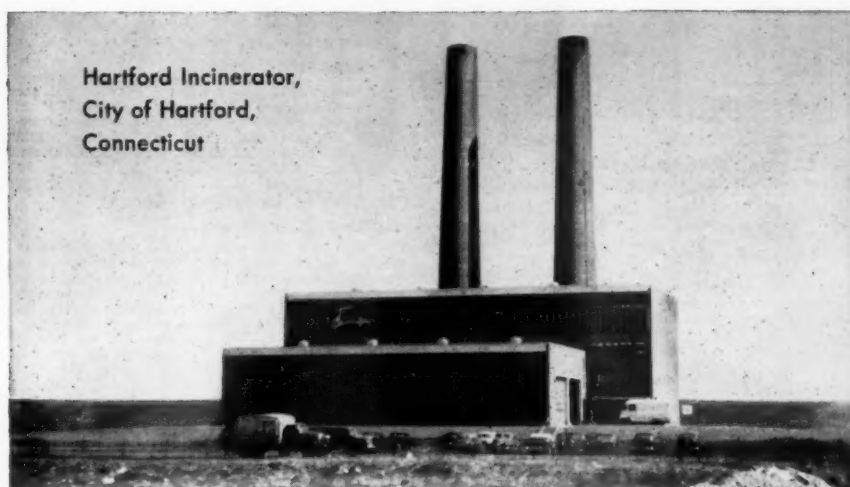
258. All-aluminum standards and brackets for mounting traffic signals over roadways and pedestal-type bases for signals mounted on the curb are described in a bulletin of Pfaff & Kendall, 84 Foundry St., Newark 5, N. J. Check the advantages of these maintenance-free units when planning new installations and replacements. Use the coupon to get latest data.

**Valuable Booklet on  
 Series Streetlighting Systems**

306. This booklet discusses the operating characteristics of mercury lamps on series street lighting systems and analyzer requirements for auxiliary equipment. Wiring diagrams and photographs to illustrate the principal equipment required for series operation are furnished. Booklet B-6513 is available from Westinghouse Electric Corporation, Lighting Division, Edgewater Park, Cleveland, Ohio, or by checking the coupon.

**How to Save on  
 the Cost of Signs**

405. Sign costs have been reduced significantly by many cities, counties and states that switched to Alcoa aluminum for signs and markers. Strength and corrosion resistance cut maintenance costs; aluminum fasteners mean trouble-free installation. For full material specifications write Aluminum Company of America, 1978-D Alcoa Bldg., Pittsburgh 19, Pa., or check the coupon.



Hartford Incinerator,  
City of Hartford,  
Connecticut

## Modern Hartford disposal plant uses **FITCHBURG CHIPPER**

Hartford's new municipal incinerator is used to dispose of more than 400,000 pounds of waste every day. The large picture above shows this efficient, attractive plant—one of the most modern in the nation.

An important part of Hartford's up-to-date disposal program is their portable Fitchburg Chipper, which cleans up disposal jobs the incinerator cannot handle, and goes out on location for road use.

### Hartford had these problems:

- Banana Stalk Disposal • Brush Disposal on New Roads
- Christmas Tree Disposal • Road Clearance from Storm Damage

### How a Fitchburg Chipper solves these problems:

Joseph J. Coffey, Superintendent of the Hartford Incinerator, tells you in his own words how Hartford solves these problems: **BANANA STALKS:** "We chip 2 to 4 tons of banana stalks each week. These stalks will not burn regardless of heat in the furnaces, and we had to dump them until the Fitchburg Chipper went on duty." **CHRISTMAS TREES:** "During the post-Christmas season we receive many Christmas trees which we can now get rid of without the trouble of watching for burnt-down spike-like stubs which cause much trouble with the incinerator equipment."

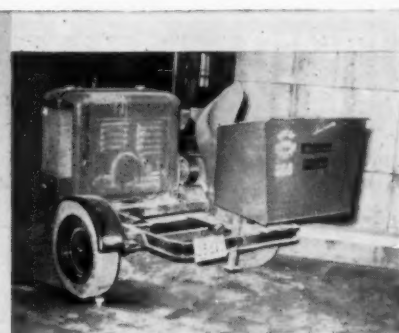
**BRUSH DISPOSAL:** "Our Highway Division has used our Fitchburg Chipper to clean up the brush and branches along newly developed road areas. By chipping brush, the city saves in use of both manpower and trucking costs." **ROAD CLEARANCE:** "If we get hit again by hurricanes or bad wind storms, we now have an excellent piece of equipment that will enable us to readily open up the streets for emergency traffic by reducing the fallen branches to chips."

As to maintenance, Mr. Coffey says: "Our Fitchburg Chipper will pay for itself in a very short time. Maintenance, so far, is just keeping it supplied with gasoline and fully lubricated. It is easy to handle, easy to store, and very easy to use."

### Get the facts!

Mail coupon for big, **FREE**, colorful booklet. Specifications, operating data, explanation of exclusive Fitchburg Safety Spring, actual letters from users.

## **FITCHBURG ENGINEERING CORPORATION**



(1) Hartford's Fitchburg Chipper



(2) Fitchburg Chipper in action

## Read what leading Fitchburg users say

### LINE CLEARANCE

*The Shade Tree Service Company, Webster Groves, Mo.:* "Our figures show that production has been increased by a good 25% with the use of the Fitchburg Chipper. One man can operate the chipper with ease. He alone can handle as much, and more, brush in the same length of time as could two men loading brush on a platform body."

### POWER COMPANY

*Rockland Light and Power Company, Nyack, N. Y.:* "Our men have been particularly pleased with their Fitchburg Chippers. They are rugged and reliable and the convenience of flexible, yet instant brush disposal has the advantage of promoting good public relations and still gives us efficiency."

Send for  
**FREE BOOKLET**



Fitchburg Engineering Corporation  
Fitchburg, Mass., Dept. V-105

Send my Free Chipper Booklet.

Name \_\_\_\_\_

(Position or Company) \_\_\_\_\_

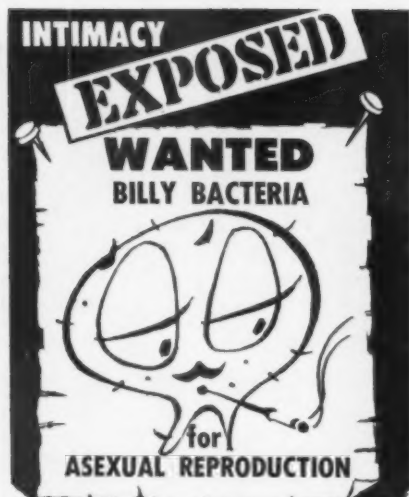
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Confidentially folks, by our standards, bacteria have a poorly balanced sex life. They have to reproduce through fission.

Pity the bacteria: no sex, no passion, no soul mate, and requiring biochemical and physical nutrition factors over which it has no control. The sex life of bacteria can be briefly summarized as one of impersonal optimism—essentially a food relationship.

Harmonious balance between bacteria and food is the basis of maximum efficiency in sewage treatment; a condition rarely achieved.

BIONETIC\* is FIRST AID TO WASTE TREATMENT and utilizes various biological mechanisms to effect the improvement of ailing digesters. Flow through rates of trickling filters, after BIONETIC treatment, have been returned to normalcy by removal of grease and sludge and without removing ballast or damaging the zoogeal growths. Hundreds of cities have cleaned their collection systems and lift stations and eliminated odors on the lines and at the plants.

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I want my membership certificate in the **LOYAL ORDER OF MANHOLE SNIFFERS**. Also please send me FREE copies of the following BIONETIC Tech Talks:

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\*Reg. TM: Reliance Chemicals Corp. Applies only to a specific method of manufacture of preserved cultures of beneficial micro-organisms of uniform potency that are field tested in waste treatment plants.

## STREETS AND HIGHWAYS

### Bitumuls Paving Handbook Full of Useful Data

23. The latest edition of the Bitumuls Paving Handbook covers a wealth of practical data on paving methods and materials, road and airport paving specifications and construction details, complete tabular data on asphaltic binder applications and aggregate requirements, condensed Asphalt Institute specifications plus data on Laykold compounded asphalts for flooring, tennis courts, protective coatings and waterproofing. You can have a copy by checking the coupon. American Bitumuls & Asphalt Co., 200 Bush St., San Francisco 4, Calif.

### 1,001 Profitable Uses For Holmes-Owen Loader

39. The addition of a Holmes-Owen Loader to your dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how this self-loading unit with hydraulic crowding action can be a real time and labor saver for the municipality or contractor. Check the handy coupon for full data. Ernest Holmes Co., Chattanooga, Tenn.

### Easy Reference on Durable Gratings and Treads

90. An easy-to-use catalog containing illustrations, descriptions and complete engineering data on grating-flooring, treads and floor armoring of riveted, press-locked and welded types has been published by Irving Subway Grating Co., Inc., 50-09—27th St., Long Island City, N. Y. To get this useful reference write to the manufacturer and ask for Catalog F400 or check the handy coupon.

### Convenient Source of Rubber for Road Improvement

128. "Surfa-Seal" Pellets, made in the form of small cubes containing 40% rubber hydrocarbons are now available for improving asphalt stability, providing low temperature flexibility and reducing hardening and stripping. A booklet which covers these advantages in detail and tells how the pellets are used and quantities required is offered by Naugatuck Chemical Div., U. S. Rubber Co., New York 20, N. Y. Just check the handy coupon.

### Lightweight Drill Aids Soil Sampling

228. Two Acker core drills, models LD and LLD, are described in Bulletin No. 21 recently made available by the Acker Drill Co., 725 W. Lackawanna Ave., Scranton, Pa. Used for cutting highway test cores, soil samples, drainage holes and for foundation test drilling, these machines are designed for fast and economical operation. Get the details by checking the coupon.

### How to Solve the Brush Disposal Problem

277. Fitchburg Chippers, engineered to solve the brush disposal problem reduce troublesome brush and trimmings to tiny, easy-to-dispose-of chips. Several models are available to meet your needs. May be mounted on truck body or on trailer, tractor or jeep. Full details in interesting, profusely illustrated 16-page bulletin. Write Fitchburg Engineering Corp., Fitchburg, Mass., or check the coupon for your copy.

### Heater-Planer Gives Low-Cost Surface Repairs

287. Low-cost resurfacing and repair work on bituminous pavements is made easy with the Littleford-Clarkmoore Heater-Planer. Machine operates continuously, heating and planing as it travels. Precise control leaves smooth riding surface. Get the details by writing to Littleford Bros., Inc., Cincinnati 2, Ohio, or check the coupon.

### Use Hot Patch Material On All Maintenance Jobs

297. With the Barber-Greene Mixall you can get hot patch material wherever and whenever you need it for all maintenance jobs. Send for new 8-page bulletin that gives full information on this small, highly portable unit that turns out all types of bituminous patch material in any quantity you need. Write Barber-Greene Co., Aurora, Ill., or use the coupon.

### Grading Can Be Faster, Cheaper and Easier

96. You'll like every feature of the Austin-Western 99H Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

### Be Sure to Investigate These Parking Meter Features

146. Parking meters designed for greater public convenience, unlimited flexibility with easy adjustment of time limit rate and coin acceptance plus simplified enforcement inspection are described in the attractive bulletin of Magee-Hale Park-O-Meter Co., Commerce Exchange Bldg., Oklahoma City 2, Okla. Get all details on the Model H meter by checking the coupon.

### Better Paving On Small Jobs

176. Blaw-Knox Company's small-job paving machine, the Adnurn Jr. 8, is the subject of a new bulletin, No. 2609. The Adnurn Jr. is equipped with a 12-HP motor. Hopper capacity is approximately 2 tons. It will pave an 8-ft. strip. For full engineering details and on-the-job performance data, get this bulletin from Construction Equipment Div., Blaw-Knox Co., Pittsburgh 38, Pa. Check the coupon.

### What Should You Look For In a Power Sweeper?

206. Helpful information to aid you in the selection of a power sweeper to fit your needs is provided in Bulletin 85.2, issued by G. H. Tennant Co., 2530 N. Second St., Minneapolis 11, Minn. Full data on the highly maneuverable Tennant Model 75 Sweeper is included. Get your copy by checking the coupon.

### How the Mobil-Sweeper Can Improve Street Sweeping

305. Sweeping costs can be cut with the Mobil-Sweeper which features safe highway speeds up to 55 mph, carries 2 2/3 cu. yd. dirt hopper, sweeps swath up to 10' wide with full floating brooms. Hills and deep gutters are no obstacle. Write to the Conveyor Co., 3260 E. Slauson Ave., Los Angeles 58, Calif. or use coupon for complete details on this machine.

### Better Mowing and Brush Removal

403. Fast, versatile tractor drawn Wood rotary mowers are available in a large selection of models to suit all types of municipal and highway department maintenance requirements. Be sure to investigate these units and discover how costs of roadside mowing, brush cutting, leaf mulching and park maintenance can be reduced with efficient equipment. Get full details by checking the coupon or from Wood Bros. Mfg. Co., Oregon, Ill.

### Effective Sweeping for Cleaner Streets

421. Outstanding features of Wayne Model 450 Sweepers are described in an attractive folder which covers operating advantages and general specifications. Data on dual control models are included. For your copy write Wayne Mfg. Co., Pomona, Calif., or check the coupon.

### Valuable Information On Aerial Surveys

437. What you should know about aerial surveys is described in detail in the latest literature just released by Alster and Associates, 6135 Kansas Ave., Northeast, Washington 11, D. C. Topographic maps, mosaics and planimetric maps by aerial photograph are fully illustrated. For more information check the handy coupon.

## RECREATION

### How to Equip Your Parks and Playgrounds

414. A handsome 60-page illustrated catalog showing a full line of extra heavy duty playground, park-picnic and dressing room equipment, plus many related items, is now available from American Playground Device Co., Anderson, Ind. Complete specifications, construction features, prices and details of labor and materials needed for installation are included. Check the coupon today.

# MUELLER®

## AWWA GATE VALVES

give *tighter* shut-offs

Only Mueller Gate Valves have the exclusive "four-point contact" disc wedging mechanism. Closing pressure is equally distributed to four separate points near the outer edge of each disc. Shut-offs are made faster, easier and tighter - without disc deflection or sliding contact. See your Mueller Representative, Catalog W-96 or write today for full details on the complete line of Mueller Gate Valves.



Iron Body, Bronze Mounted  
Double Disc, Parallel Seat Type  
"O" Ring Seal or Conventional Packing  
2" Operating Nut or Handwheel  
Hub, Flanged, Spigot, Universal, Screwed,  
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Mueller Non-Rising Stem Gate Valves up to 12",  
which were originally equipped with conventional packing.

### MUELLER CO.

Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

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## FOR BETTER SEWERAGE PLANT PERFORMANCE

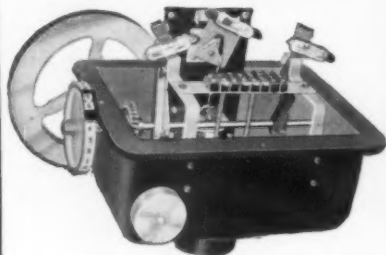


Engineers who investigate Lakeside Engineering Corporation equipment performance often come out with ideas that make for better treatment results for the entire life of their plants.

Lakeside Spiroflo Clarifiers and Spiragesters have advantages and economies all their own. These are fully detailed in Bulletin 122 for Spiroflo, 124 for Spiragester. Write for yours today.

**LAKESIDE ENGINEERING CORP.** 222 West Adams Street  
Chicago 6, Ill.

## ROTO-TROL



### RF-2 with ALTO-TROL

*Puts that second pump to work.*

A 2-pump RF-2 ROTO-TROL with a built-in ALTO-TROL will operate each pump on alternate starting cycles, assuring equal use and wear of both pumps. Operates both pumps when required. FLOAT-CONTROLLED. Depth Indication optional — extra.

*Write for full data.*

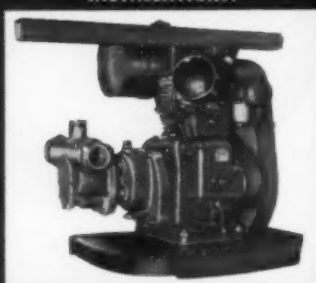
Water Level Controls Division

**HEALY-RUFF Company**

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## WATER MAIN PRESSURE TEST PUMP

PORTO PUMP A ROTARY, RUBBER GEAR PUMP MECHANIZES AND EXPEDITES THE PRESSURE TESTING OF WATER MAINS AND FIRE SPRINKLER INSTALLATIONS.



Quickly develops required testing pressure up to 200 PSI. powered by dependable 4 cycle gasoline engine, weighs 95 lbs., only one man required for pump operation, saves time and labor, increases profits, —also excellent for jetting operations, core and exploratory drilling operations, cleaning transit mix cement trucks and dirty equipment, wetting down poured concrete structures, such as bridge supports, and various other applications requiring a portable pressure pump.

Dealers Inquiries Invited

**PORTO PUMP, INCORPORATED**  
227 IRON STREET, DETROIT 7, MICH.

Get full details of this month's products . . . mail your Readers' Service card today.

## SNOW AND ICE CONTROL

### Uniform Salt Spreading Saves Material

42. The wide, thin pattern provided by Tarco "Scotchman" spreaders avoids salt waste, saves time and labor. Get Folder BL for full details on this spreader and table of material application rates. Use coupon or write Tarrant Mfg. Co., Dept. PW, Saratoga Springs, N. Y.

### Reversible and Roll-Over Type Snow Plows for any Depth of Snow

289. Village, city, county, state and airport officials send for the latest information on Frink's two catalogues on reversible trip-blade and roll-over snow plows. Complete assembly details, specifications and operation are completely outlined. Write to Frink Snow-Plows, Inc., Clayton, Thousand Islands, New York, or check the handy coupon for the catalogues.

### Ice Control Without Corrosion Dangers

439. Virtually all corrosion is prevented when rust inhibitor "Banox" is used in conjunction with salt for snow and ice control. Properties of this material and performance results are described in bulletins issued by Calgon, Inc., Hagan Bldg., Pittsburgh 30, Pa. Check coupon for your copies.

## REFUSE COLLECTION AND DISPOSAL

### How New, Larger Load-Packer Cuts Refuse Collection Costs

51. Ever increasing problems in refuse collection work include longer hauls and higher costs of labor, chassis, operation and maintenance. As a solution, Gar Wood offers Load-Packers with dual-thrust compaction that gives big capacity on shorter wheelbase, plus safe, labor-saving operation. Profusely illustrated Form W-144 tells why you should investigate Load-Packers. Check coupon or write Gar Wood Industries, Inc., Wayne, Mich.

### New Development in Refuse Collection

119. The newly introduced "Dempster-Dumpmaster" system for refuse collection combines the advantages of detachable containers for bulk collection, convenient front-end loading and compaction in a sealed body. Be sure to investigate the application of this system to your collection needs. Complete data offered by Dempster Bros., Knoxville 17, Tenn. Check the coupon today.

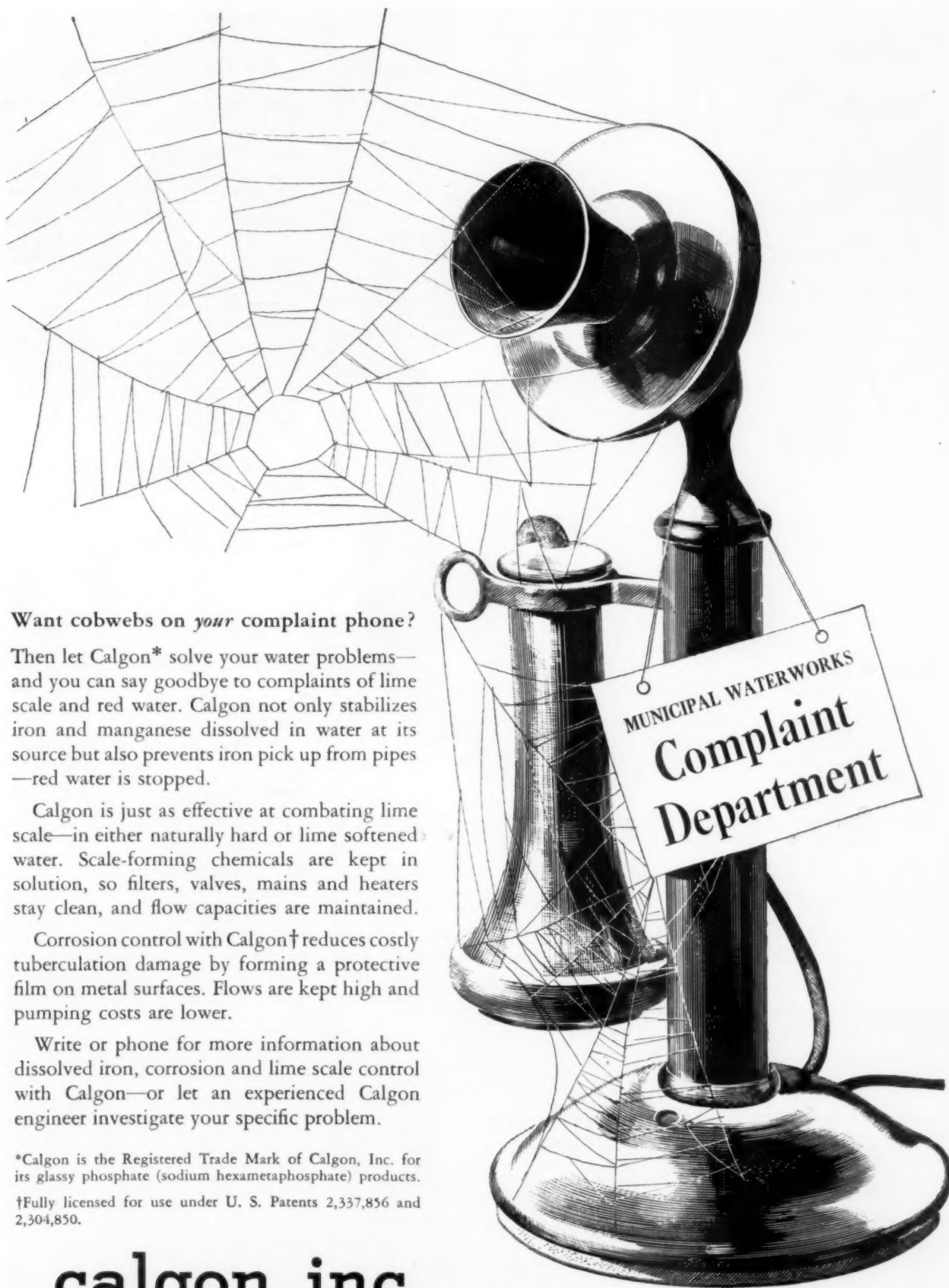
### What You Should Know About Refuse Incinerators

362. Two helpful bulletins tell what you should know about low cost refuse incineration for the small community and for larger cities. Your questions on mechanical stoking, burning rates and operating problems are discussed. Get Bulletins 217 and 223 from Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y. Just check the coupon.

### Check These New Features On Refuse Collection Bodies

383. The all-new Heil "Collectomatic" refuse collection unit incorporates the best features suggested by municipal operating crews, supervisors and private operators to provide easy loading, simple operating mechanism, bulldozer type packing, fast dumping and many other important advantages. Check them all by getting attractive Bulletin BH-54103 from The Heil Co., 3044 W. Montana St., Milwaukee 1, Wis. Your copy is ready—just check the coupon.





**Want cobwebs on *your* complaint phone?**

Then let Calgon\* solve your water problems—and you can say goodbye to complaints of lime scale and red water. Calgon not only stabilizes iron and manganese dissolved in water at its source but also prevents iron pick up from pipes—red water is stopped.

Calgon is just as effective at combating lime scale—in either naturally hard or lime softened water. Scale-forming chemicals are kept in solution, so filters, valves, mains and heaters stay clean, and flow capacities are maintained.

Corrosion control with Calgon† reduces costly tuberculation damage by forming a protective film on metal surfaces. Flows are kept high and pumping costs are lower.

Write or phone for more information about dissolved iron, corrosion and lime scale control with Calgon—or let an experienced Calgon engineer investigate your specific problem.

\*Calgon is the Registered Trade Mark of Calgon, Inc. for its glassy phosphate (sodium hexametaphosphate) products.

†Fully licensed for use under U. S. Patents 2,337,856 and 2,304,850.

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HAGAN BUILDING • PITTSBURGH 30, PA.**

## CONSTRUCTION EQUIPMENT AND MATERIALS

### Thinking of Sanitary Landfills? Get This Booklet Now

131. One of the most informative descriptions of the sanitary landfill method of garbage and refuse disposal is presented in Caterpillar's 16-page booklet "A Look to the Future with Sanitary Landfill." The booklet is designed to serve as a guide to proper site selections, the choice of the right equipment to do the job, and the actual operations of sanitary fill. Pictorial treatment shows how and when to start such a program, what to look for in a site, benefits received by the community, and other important considerations. Published by the Caterpillar Tractor Co., Peoria 8, Ill. Check the coupon for your copy.

### How Air Placement of Concrete Will Help on Your Jobs

215. There are hundreds of jobs that can be done easier and cheaper by air placement of concrete: reservoir, tank and pool linings, concrete maintenance of all sorts are just a few of the applications. Get full details on two models of the high speed, easily operated "Bondactor" from Air Placement Equipment Co., 1009 West 24th St., Kansas City 8, Mo. Check the coupon.

### How To Build Stabilized Heavy Traffic Pavements

233. A 16-page booklet published by Seaman Andwall Corp., Milwaukee, Wis., shows how low cost, local materials may be utilized in the construction of heavy duty pavements. Many illustrations and well-written text give full instructions on materials and construction methods for subgrades, subbases and base courses. A worth-while booklet for every highway engineer. Check coupon for copy.

### Helpful Data On Pipe Tools

230. Toledo drop head ratchet threaders are light, compact, ideally suited for work in tight corners. Three models for  $\frac{1}{8}$ " to  $\frac{3}{4}$ ";  $\frac{1}{4}$ " to  $1\frac{1}{4}$ "; and  $\frac{1}{2}$ " to 2" pipe all feature quick change of sizes. Get Catalog No. 25 from Toledo Pipe Threading Machine Co., Toledo, Ohio. Check the coupon.

### Comprehensive Data on Bulldozers

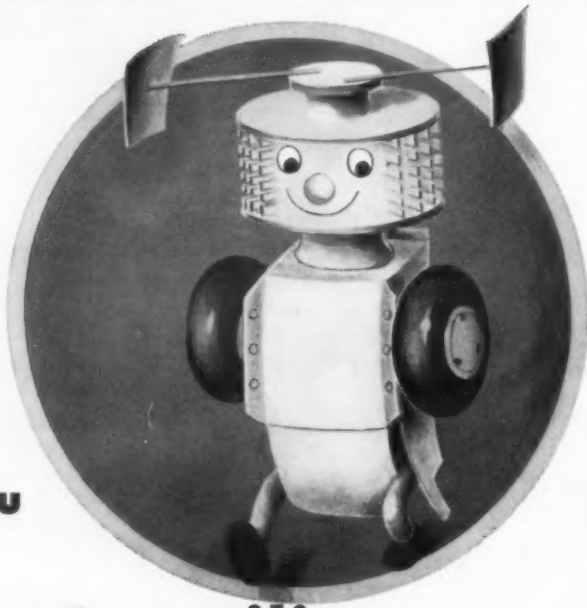
232. Hydraulic Bulldozer and bulldozer blades for International crawler tractors are described in a 24-page catalog published by International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. All features are fully described, complete specifications are included and many illustrations show on-the-job operations. Check the coupon for your copy.

### Economical Scraper Handles Many Heavy Jobs

398. Among the many applications of the versatile Model D Tournapull are: grading and building roads; handling garbage disposal, and grading, leveling and terracing. For details on how its speed, power and ability to work either as a self-loading tool can help your production and lower your costs, write Le Tournau-Westinghouse Co., Peoria, Ill., or check the coupon.

### Power Shovel, Crane and Backhoe All in One Unit

441. A completely hydraulic backhoe, shovel loader and crane all in one unit is described in literature available from the Badger Machine Co., Winona, Minn. Also, information on front-end loaders and other attachments that are useful for contractors, municipal and county engineers and state highway engineers. Check the coupon.



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and tuberculation... increasing flow capacity... reducing leakage... slashing pumping costs... and adding years and years of pipe life. If you'd like to learn more about Mr. Centrine and how he can work for you, just write or call for one of our descriptive brochures.

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## SEWERAGE AND WASTE TREATMENT

### What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 110 E. 45th St., New York 17, N. Y. Check the coupon and we will forward your request.

### New Bulletin Introduces Dorrco Aldrich PeriFilter System

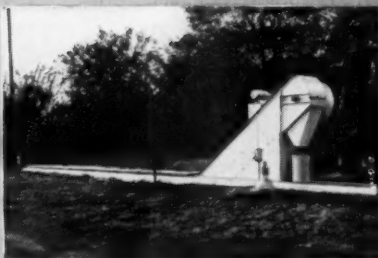
21. By combining a pre-treatment mechanism and an annular rapid sand filter in a single unit, the Dorrco Aldrich PeriFilter system offers a substantial reduction of initial installation costs and permits unusual design flexibility for treatment of municipal and industrial water supplies. For details on the system, including instrumentation and operation get Bulletin No. 9042 by writing Dorr Oliver Inc., Barry Pl., Stamford, Conn., or check the coupon.

### A Handbook of Sewer Cleaning Methods and Materials

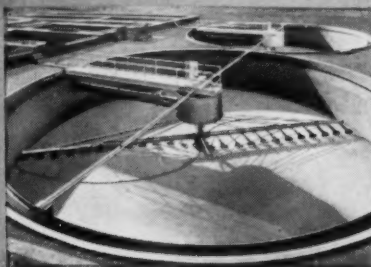
44. Complete, easy-to-follow directions for every type of sewer cleaning operations and the equipment needed for effective cleaning work is covered in a 48-page booklet issued by Flexible, Inc., 3786 Durango, Los Angeles 34, Calif. Full details are provided on power cleaning machines, the Seweroder, hand tools and all accessories. Water main and culvert cleaning methods are included. Check the coupon for your copy of this helpful handbook.

### High Rate Filters For Sewage Treatment

74. Accelerated biological oxidation in treatment of sewage and other organic wastes is a feature of Infilco's Accelo Filter system. Bulletin 6200 explains the direct recirculation principle, shows plant layouts, and gives performance data. For your copy write Infilco Inc., Box 5033, Tucson, Ariz., or check handy coupon.

**Better Grit Conditioning**

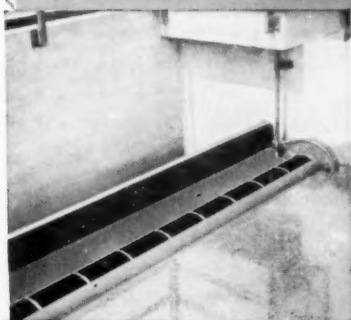
Rex Pioneering of the recirculation principle in grit chambers led the way to cleaner grit . . . more efficient removal.

**Better Sludge Removal**

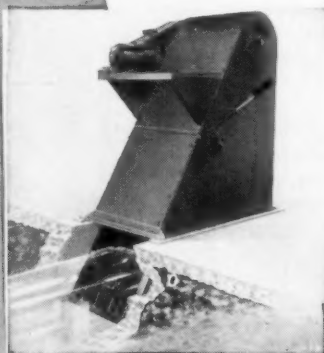
Development of the Rex Tow-Bro Sludge Remover with its unique, gentle, suction-type action assured better removal of light, flocculent sludge.

**Better Settling**

Introduction of the Rex Verti-Flo® Clarifier made possible improved settling . . . increased capacities . . . important cost savings.

**Better Skimming**

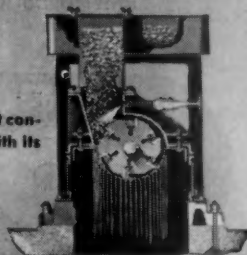
Development of Rex Full-Width Skimming Equipment, manual and automatic, made possible more efficient removal of floatable material.

**Better Solids Removal**

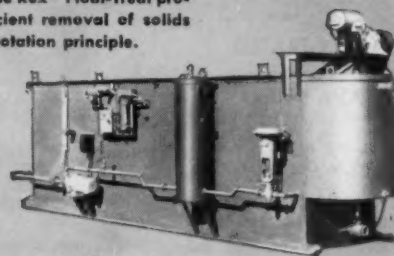
Development of Rex Front Cleaning Bar Screens assured more efficient removal of solids.

**Better Grinding**

The Rex Triturator was an important contribution to improved operations with its 2,000,000 blade cuts per minute.

**Better Flotation**

Introduction of the Rex® Float-Treat provided more efficient removal of solids through an air flotation principle.



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treatment equipment

Continuous research, product development and improvement have long been guiding principles of CHAIN Belt Company. The important developments illustrated above are but a few of the contributions CHAIN Belt has made to more efficient plant performance . . . a quarter century of sanitation progress. Such mechanical features as Z-Metal chains, self-aligning bearings, centralized wearing shoes, split head-shaft sprockets have meant much in longer life, lower operating and maintenance costs and better operation to plant operators the world over.

Your Rex Field Sales Engineer will be happy to give you the complete details. Or, write CHAIN Belt Company, 4722 W. Greenfield Ave., Milwaukee 1, Wis.

## CHAIN BELT COMPANY

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### Helpful Design Data For Sewage Ejectors

81. The application and advantages of pneumatic sewage ejectors are outlined in a new bulletin of the Blackburn Smith Mfg. Co., Inc., Hoboken, N. J. Included are piping diagrams for electrode and float switch controls plus dimensions and layouts for single and duplex systems. Get your copy by checking coupon.

### Theory of Controlled Digestion With Floating Cover Tanks

88. In an excellent 40-page booklet, an authoritative discussion of digestion theory and practices, including design, operation and economics is presented by the Pacific Flush Tank Co., Chicago 13, Ill. Complete data are given on the use of floating covers, together with details on tank construction, piping and control chambers. Requests for this valuable booklet must be made on business letterhead.

### Mechanical Joint Principle Applied to Sewer Pipe

101. The Amvit joint forms a tight compression seal between bell and spigot rings, prevents infiltration and stops root intrusion. Get data on Amvit jointed vitrified clay pipe from American Vitrified Products Co., Cleveland, Ohio.

### Spiraflo Clarifier

124. Be sure to investigate the advantages of the Spiraflo clarifier for sewage treatment. Full engineering data, description of the unit, test results and specifications are offered in 24-page Bulletin 122 by Lakeside Engineering Corp., 222 W. Adams St., Chicago, Ill. Check the coupon today.

### Comminutors for Automatic Disposal of Coarse Sewage Solids

152. The problems connected with disposal of coarse sewage solids are eliminated by clean, odorless, automatic Comminutors. Full engineering data show the proper model for every size plant and furnish details of hydraulics and typical installations. Chicago Pump Co., 622 Diversey Pkwy., Chicago 14, Ill.

### Non-Clogging Vertical Wet-Pit Pump Described

182. Full engineering data on Worthington "Freeflo" wet-pit pumps with non-clogging impellers capable of passing solids and stringy material are included in Bulletin W-317-B12. Check these pumps for sump, sewage and drainage service. Bulletin available from Worthington Corp., Harrison, N. J. Just use the coupon.

### Reduce Labor Costs With Power Sewer Cleaners

189. A complete line of sewer cleaning equipment, including labor saving power units and all types of buckets, cables, rods and flushing equipment are listed in Catalog 10 of the Turbine Sewer Machine Co., Division of Chas. H. Stehling Co., 1303 N. Fourth St., Milwaukee 12, Wis. Check the coupon for your copy.

### Data Offered on Water, Sewage and Waste Treatment Equipment

263. Equipment for sewage treatment, water purification and industrial waste treatment is described in a 16-page Book No. 2440, published by Link-Belt Co., Colmar, Pa. Case histories, photographs and schematic drawings are included. Straightline and Circuline collectors, Thru-Clean and Straightline bar screens, Tritor screens, flash mixers, scum breakers and other units are described. Check the coupon for your copy.

### Helpful Data on Bermico Pipe Fittings

280. Data are now available on fittings for use with Bermico sewer pipe and perforated pipe—T's, Y's and bonds—in sizes and combinations not previously available. These make complete root-proof, water tight, corrosion-resistant Bermico pipe systems. Get full information by checking the coupon. Brown Co., 150 Causeway St., Boston, Mass.

### Blower Selection Data Aids Sewage Plant Design

274. Characteristic curves for blower operation with constant-speed, multi-speed and variable speed motors; details of several types

of blowers; data on accessories; and a discussion of advantages of positive displacement rotary blowers are provided in Bulletin RB-154 of Roots-Connersville Blower Div., Connersville, Ind. Get this helpful bulletin by checking the coupon.

### A Pressure Proven Joint for Concrete Pipe

335. Investigate the Amseal Joint on low pressure concrete pipe for intercepting sewers, inverted syphons, sewage force mains and low pressure water supply lines. This folder is published by American-Marietta Company, Concrete Products Division, 101 East Ontario St., Chicago 11, Illinois. Describes concrete pipe for use in sewer and water lines where maximum operating pressure will not exceed 50 psi. Check the coupon today.

### Engineering Data on the "Cavitator" Waste Treatment System

323. Detailed information on the Cavitator system for secondary treatment of municipal waste is offered by Yeomans Brothers Co., 1999 N. Ruby St., Melrose Park, Ill. Be sure to investigate this system which offers high oxygen transfer efficiency, high performance on relatively low flows and low installation and operating costs. Check the coupon for full data.

### "Float-Treat" Process For Industrial Wastes

333. The Rex "Float-Treat" process, a system used to separate greases, chemical flocs and suspended organic matter from industrial waste liquids, is the subject of a new booklet issued by Chain Belt Co., Milwaukee 1, Wis. Detailed description includes plan views, diagrams, photos and text. Get Bulletin 54-82 by checking the coupon.

### Combat Unpleasant Odors At Municipal Sanitation Sites

404. Malodors at municipal refuse disposal sites, waste treatment plants and incinerators may be effectively "neutralized" by the odor masking products of Rhodia, Inc. Be sure to investigate this means of eliminating complaints from unpleasant odors. Write Rhodia, Inc., 230 Park Ave., New York 17, N. Y. or check the coupon.

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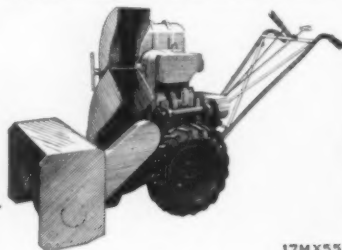
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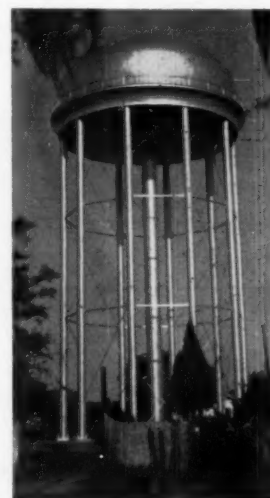
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Now's the time to mail this month's Readers' Service card.

# Bitumuls Black Seal puts new life in city streets



Bitumuls Black Seal, consisting of a single application of Bitumuls emulsified asphalt, puts new life in weathered pavement surfaces.

## Merced, California, treats 140,000 square yards at cost of \$1050

A recent survey of residential streets in one section of Merced, California, indicated that the paved surfaces were starting to deteriorate at an alarming rate. Some were streets originally built of concrete and later resurfaced with a one-inch asphalt plant-mix overlay. Others were plant-mix surfacing on a rock base.

For those surfaces that were seriously cracked, broken or ravelled, specifications were drawn up calling for Bitumuls® Surface Treatments (either Single or Double, with chip-cover).

### Preventive Maintenance Indicated

On many of the streets, however, the surfaces while still in relatively good condition were oxidized, dry and open-textured. The Engineers realized that unless some form of "preventive maintenance" were undertaken, these surfaces would soon require extensive repairs and possibly complete resurfacing. What they needed was a method of revitalizing these surfaces, plus the placement of additional binder to seal the interstices against water damage.

### Bitumuls Black Seal Selected

After investigating several proposed methods, the Engineers decided on the use of Bitumuls Black Seal to rectify the situation. For this work 0.1 gal. per sq. yd. of (1:1) diluted Bitumuls

SS-2 emulsified asphalt was applied to the surfaces. No cover was used. This treatment provided the necessary binder to adequately seal the pavement, and the coating was thin enough on the high spots to prevent pick-up under traffic which was allowed over the pavement within one hour.

### Adaptable To Wide Application

Costs of the Black Seal work and for the other Bitumuls Surface Treatments are given in the table below.

Dry and open-textured paved surfaces are not peculiar to Merced. This method of economically extending pavement life merits investigation by communities in every part of the country. *Specifications on Black Seal, and on Bitumuls Surface Treatments, are available on request.*



Engineers of Merced and Fresno, California, inspect pavement to be revitalized.



Before. Here is a representative dry, weathered surface for which Engineers of the City of Merced recommended Bitumuls Black Seal.



After. Notice the tight, uniform texture obtained by a single Black Seal application. No tendency toward fatness or bleeding.

### COST SUMMARY

ITEM	I Black Seal	II Single Chip Seal with Black Seal	III Double Chip Seal with Black Seal
Labor (including Rock Haul)	\$210	\$168	\$602
Bitumuls RS-1 at 10c per gal.		160	829
Bitumuls SS-2 at 11c per gal.	840	90	396
1/2" Crushed Rock at \$2.35 per ton			668
3/4" Crushed Rock at \$2.35 per ton		151	
1/4" Crushed Rock at \$3.35 per ton			450
Total Cost (labor & materials)	\$1050	\$569	\$2945
Total Square Yards	140,000	6240	16,090
Cost per square yard (labor & materials)	\$.0075	\$.0913	\$.183

Note: Cost does not include equipment rental.

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Bitumuls & Asphalt  
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Get full details of this month's products . . . mail your Readers' Service card today.

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# TOPS for strength,

For jobs, where long life is a *must*, you can specify cast iron pipe with confidence. Confidence in its strength and toughness—its ability to withstand beam-stresses, traffic shock, compressive loads—its proved long life over a history running into centuries. The factors which endow cast iron pipe with its great durability are also the factors which mean negligible repairs and maintenance costs. When the job calls for *permanence*, specify cast iron pipe. For further information, write Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Avenue, Chicago 3.

CAST  IRON

The Q-Check stencilled on pipe is the Registered Service Mark of the Cast Iron Pipe Research Association.

Installing cast iron pipe for discharge lines from water circulating pump house to refinery units of oil refinery in middle west.

Mechanical joint cast iron pipe being installed for gas main in Milwaukee, Wis.



## CAST IRON PIPE

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# **toughness and long life**

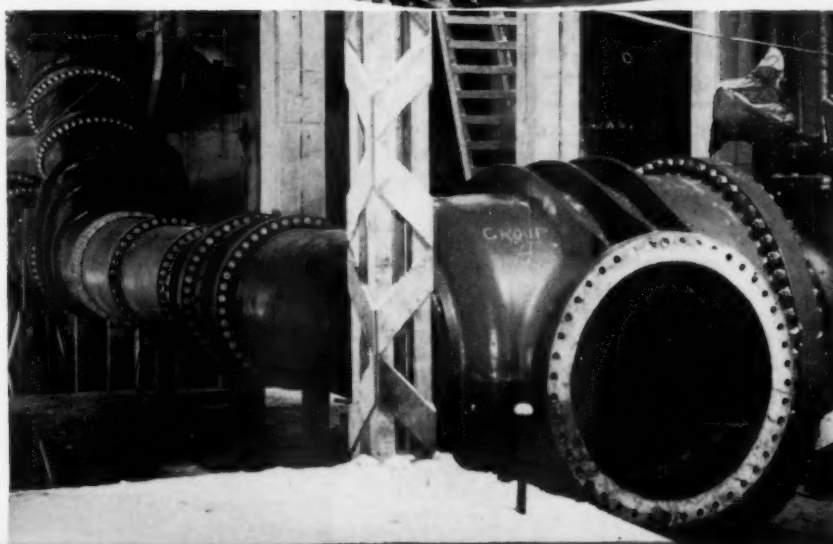


Installing 18" Flexible Joint cast iron pipe for sewer line from mainland to Sherman's Island, Panama City, Florida.



36" cast iron cement-lined pipe for discharge header from pump house to main transmission line in water supply system of Houston, Texas.

Installation of cast iron pipe and fittings in large filtration plant in Chicago, Ill.



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# CHAPMAN *Standard* SLUICE GATES

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**Wide Selection** — There are over 300 types and sizes of standard Chapman Sluice Gates to meet most conditions. Controls are for either manual, hydraulic or electric motor driven operation. Many special designs and sizes are also available.

2

**Easy Installation** — Chapman Standard Sluice Gates are faster and simpler to install because component parts are interchangeable. They fit perfectly, every time, without expensive and time consuming matchmaking or field alterations.

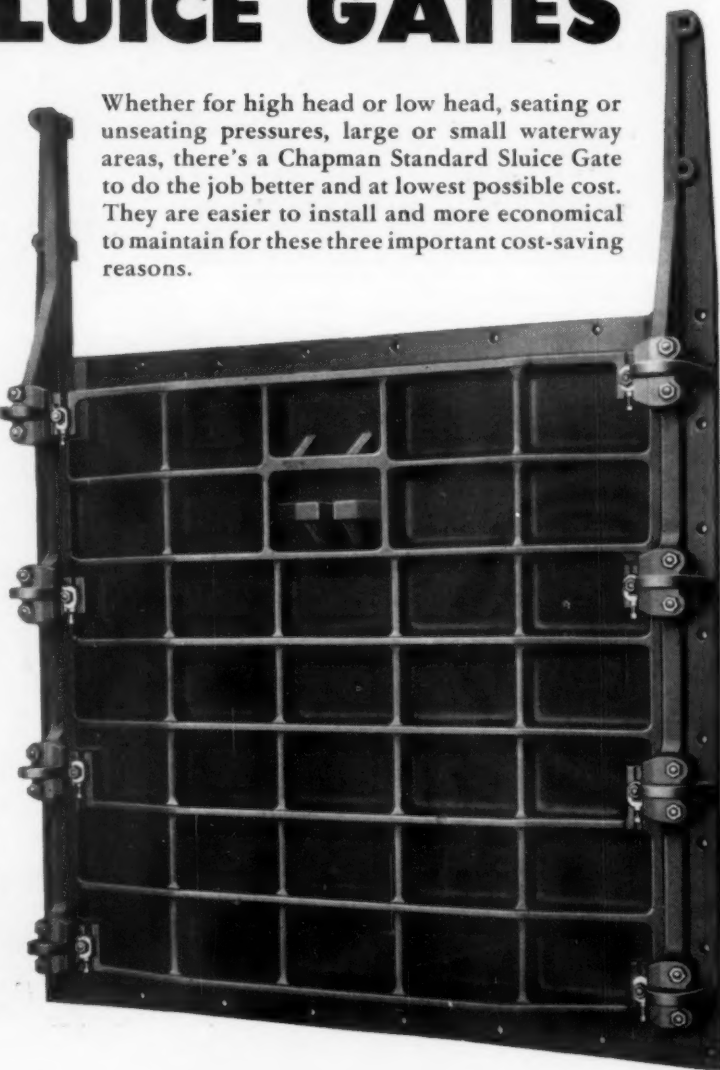
3

**Replacement Parts** — Standardized manufacture means that should repair and replacement parts be needed, they will fit perfectly into place without fitting. Servicing and repairs can be done at the job with minimum expense.

Chapman Standard Sluice Gates have been job-tested in waterworks, sewage works and flood control projects across the country. They are your assurance of top performance at lowest cost. If your current project calls for sluice gates, be sure to write for revised Catalog 25A and check the big advantages that only the Chapman Standard Sluice Gate Line offers.

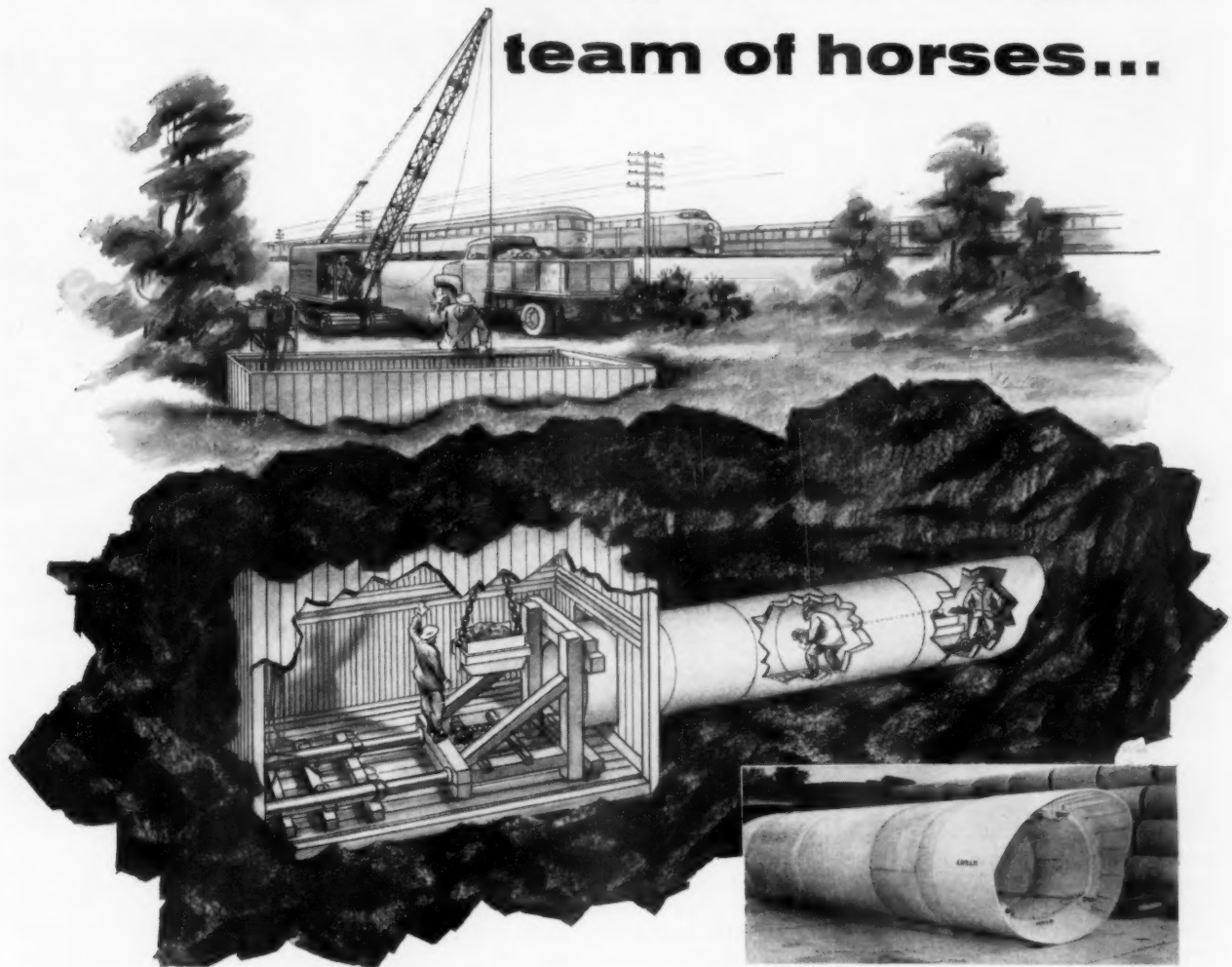
**THE CHAPMAN VALVE  
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Whether for high head or low head, seating or unseating pressures, large or small waterway areas, there's a Chapman Standard Sluice Gate to do the job better and at lowest possible cost. They are easier to install and more economical to maintain for these three important cost-saving reasons.



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### Steer to Maintain Grade and Alignment

The unusual maneuverability of the pipe head in the AMRAM jacking system is made possible by the use of truss rods that may be tightened or loosened to alter the forward course. Where necessary, gasket-rings between the leading sections of pipe will provide greater

resiliency and flexibility for a wider range of control.

AMRAM Jacking Controls are designed for use with Lo-Hed, Inner Circle and round, reinforced concrete pipe in sizes above 30" internal diameter. Write today for complete information.



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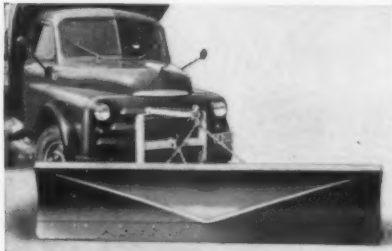
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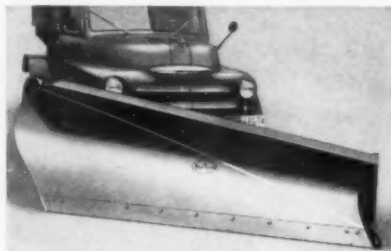
# Good Roads "Champion" Snow Plows and "Jet" Spreaders Banish Winter Road Hazards...



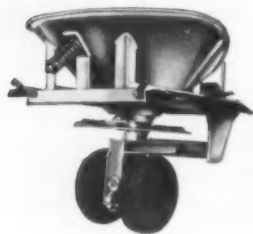
**V-PLOW**—for high speed, tough going in deep snow—left or right hydraulically operated wings optional—in sizes for jeeps to 10-ton trucks.



**REVERSIBLE BLADE PLOW**—Adjusts to 5 plowing angles—straight push and left or right. Used in small and congested areas, parking lots, etc., on medium and small trucks—in sizes for jeeps to 10-ton trucks—equipped with Good Roads Safety Blade Trip.



**ONE WAY PLOW**—For high speed, capacity and safety—ideal for open highway use—3 plowing angles—adjustable vertical pitch—in sizes for jeeps to 10-ton trucks—equipped with Good Roads Safety Blade Trip.



**THE LOW-COST 4-U SPREADER**—fits any dump truck—adjustable spread up to 270°—variable width control—available in 5 sizes.



**THE "JET" SPREADER**—In addition to 5 standard models, is available for special applications for mounting on dump bodies, stake or special chassis—used for spreading salt, sand, cinders, calcium chloride, seal-coating and aggregate.

For high-speed removal of heavy drifted highway snow . . . or snow control on city streets . . . you'll find Good Roads "Champion" plows the most economical and efficient weapons to combat nature's challenge. Included in the "Champion" line are snow plows for heavy, medium, and light prime movers.

For quick, efficient ice and sleet control, Good Roads line of "Jet" spreaders are designed to overcome the toughest icing conditions. Fast action, maneuverability, wide coverage and accurate spread control, important to fast control of icing, is built into all models in the "Jet" line.

## FIVE STANDARD MODELS, in various sizes:

**JET ACE**—Gasoline Motor Driven, Twin Spinner, Electric Cab Controls.

**JET KING**—Gasoline Motor Driven, Twin Spinner, Cable Cab Controls.

**JET QUEEN**—Gasoline Motor Driven, Single Spinner, Cable Cab Controls.

**JET JACK**—Power Take-Off Driven, Single Spinner, Cable Cab Controls.

**JET HYDRAULIC**—Full Hydraulic operation on conveyor and spinners, cab controlled, powered from power take-off through Hydraulic pump.

For complete details on how Good Roads snow and ice control equipment can help you overcome winters' hazards, write to:

**THE GOOD ROADS  
MACHINERY CORPORATION**  
MINERVA, OHIO



SNOW PLOWS



ICE CONTROL SPREADERS



AGGREGATE AND ASPHALT SPREADERS



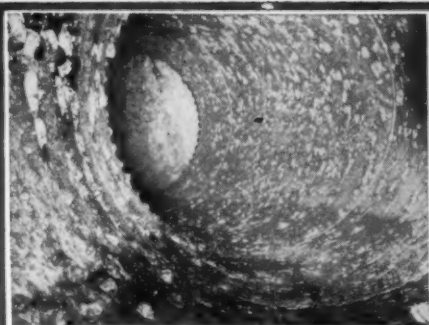
LEAF COLLECTOR



SCAVENGER

Get full details of this month's products . . . mail your Readers' Service card today.

# Your city, too, can get hardening of the arteries



TUBERCULATION HAS SERIOUSLY REDUCED THE CAPACITY OF THIS PIPELINE.



TWENTY YEARS OF SERVICE HAVE NOT REDUCED THE ORIGINAL HIGH CARRYING CAPACITY OF THIS LOCK JOINT CONCRETE PIPELINE.

Water pipes, like blood vessels, can become congested and their efficiency seriously impaired by deposits on their inner walls. To avoid this "hardening of the arteries", far-sighted hydraulic experts insist on added protective linings for pipeline materials adversely affected by aggressive water.

Such costly protection is unnecessary in **LOCK JOINT CONCRETE PRESSURE PIPE**. The dense inner wall of this virtually ageless pipe is inherently immune to tuberculation, and consequently maintains its initial high carrying capacity *permanently*.

Its great durability and trouble-free service assure you the most economical and efficient pressure pipeline obtainable.



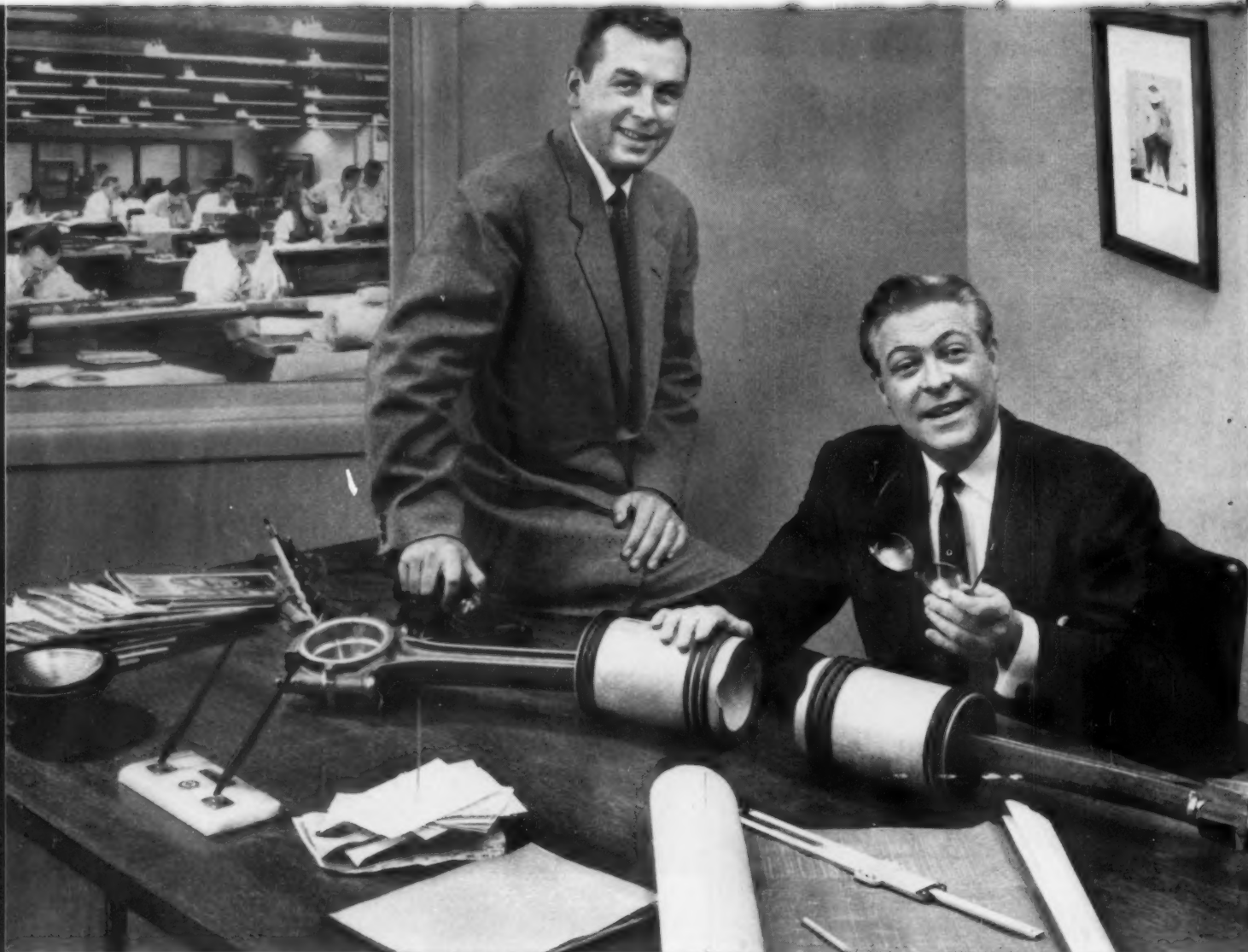
## LOCK JOINT PIPE COMPANY

East Orange, New Jersey

Sales Offices: Chicago, Ill. • Columbia, S. C. • Denver, Col. • Detroit, Mich. • Hartford, Conn. • Kansas City, Mo.

Pressure • Water • Sewer • **REINFORCED CONCRETE PIPE** • Culvert • Subaqueous

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## *They were asked, "Why two when one will do?"*

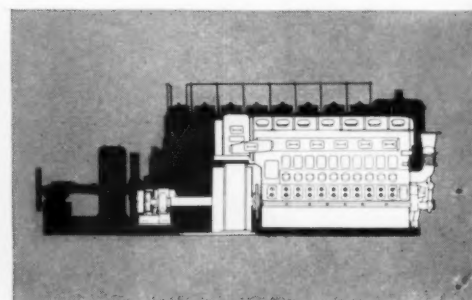
That's often the first reaction to the Fairbanks-Morse Opposed Piston Diesel... "Why two pistons?"

The answer given by the F-M Diesel Design Staff is quite simple: two pistons reacting to the forces of combustion in a common cylinder give you greater horsepower per cylinder... more power per foot of floor space... far less vibration, and, as it happens, a far more simple engine with 40% fewer moving parts to wear and maintain.

Only from Fairbanks-Morse can you get such originality and soundness of *new* design that assure outstanding performance. When next you need a Diesel Engine... or a scale... an electric motor... or a pump, look for the famous F-M Seal and see the difference that quality makes. Fairbanks, Morse & Co., Chicago 5, Illinois.



**The Secret** is this cylinder liner that contains two pistons. It eliminates cylinder heads and their gasketed joints, intricate valve trains and their timing—all parts that require skilled maintenance.



**The Result** is a compact, lightweight diesel that permits installing *more* horsepower in the *same* space occupied by any other comparable engine. And horsepower for horsepower, the O-P is the easiest to maintain.



# **FAIRBANKS-MORSE**

*a name worth remembering when you want the best*

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS



**in water treatment problems...**

*you won't find identical twins.*



No two water treatment problems are exactly alike. The right solution to each can only be arrived at after a careful study of the local conditions. Variables such as raw water composition, rate of flow and results required automatically rule out the cure-all approach. The installation shown below is a good example of how equipment should be selected to fit the job... and not vice versa.



*Washington,  
Penna.*

### **Filtration Plant Construction Costs Cut using DORRCO Aldrich PeriFilter\* System**

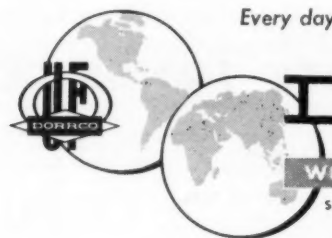
The Citizen's Water Company of Washington, Pennsylvania recently started up this compact, attractive filtration and softening plant. A Dorrco Aldrich PeriFilter System was selected as the most economical answer to meet local conditions. Consisting of two 49'6" dia. Dorrco Hydro-Treators, each surrounded by an annular rapid sand filter, the plant has a softening capacity of 4 MGD.

The unique PeriFilter design cuts construction costs because both pre-treatment unit and filter are installed in the same tank. Valves and piping are greatly simplified. Reduced head losses and simple operation add up to lower operating costs.

If you'd like more information on the PeriFilter System write for Bulletin No. 9042. No obligation, of course.

Every day, nearly 8 billion gallons of water are treated with Dorr-Oliver equipment

\*Trademark of Dorr-Oliver Incorporated



# **DORR-OLIVER**

INCORPORATED

**WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT**

STAMFORD • CONNECTICUT • U.S.A.


Need more facts about advertised products? Mail your Readers' Service card now.




AT FIVE PLANTS ACROSS COUNTRY, the Jones Company receives tank cars of Chlorine, repackages it in cylinders and ton-tanks, makes quick deliveries to users in area.

## CHLORINE: Fast delivery on less-than-carload lots


**Pick Your Own Chlorine Product and Container**



**LIQUID CHLORINE**  
In 16-, 105-, 150-lb. cylinders and 1-ton tanks.



**CALCIUM HYPOCHLORITE**  
(70% available Chlorine) 3% and 5-lb. tins, 100-lb. drums.



**SODIUM HYPOCHLORITE**  
Gallons, carboys. Tankwagon deliveries in 1000-3000 gal. lots.



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(Indianapolis), Ind.  
Tele—  
Idlewood 1443, 1444

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610 McNinch St.  
Charlotte, N. C.  
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You get swift delivery—and NO storage worries—when you turn your Chlorine problem over to John Wiley Jones Company. Five plants, strategically located across the U.S. stand ready to supply you.

Order shipments as small as a 16-lb. cylinder of liquid Chlorine, and as large as you want. With this flexibility, you eliminate storage problems. We supply more municipalities than all other Chlorine packers combined.

Quality is exceptional—meets high government standards!

Our trained technical staff will be glad to help you solve your Chlorine problem. Write for prices.

Now's the time to mail this month's Readers' Service card.



## New **HOMELITE** Pump Whispers While It Works

Goodbye residential complaints! Here's a new light-weight gasoline engine driven pump that takes it easy on the neighbors' ears. Yet handles any water problem . . . from seepage to volumn pumping! The new Homelite Model 36 S2 2" self priming centrifugal Pump operates at slow speed with low noise level yet has high capacity of 9000 gallons per hour. It weighs only 85

pounds and can be easily carried by one man to the best pumping location. Starts quickly, primes automatically, gives long, dependable and trouble-free service under the toughest conditions. Ask your Homelite Representative for a free demonstration. You'll find a good neighbor policy in every pump.

### **HOMELITE CORPORATION**

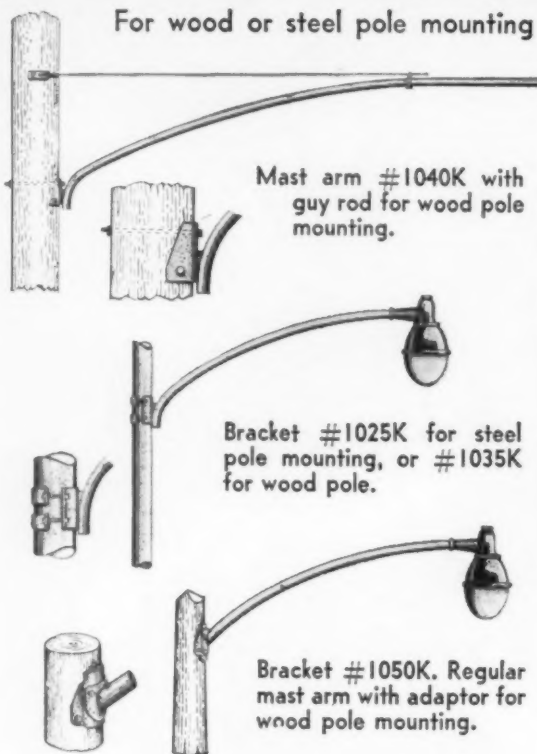
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# KERRIGAN *Weldforged* Steel Brackets & Mast Arms

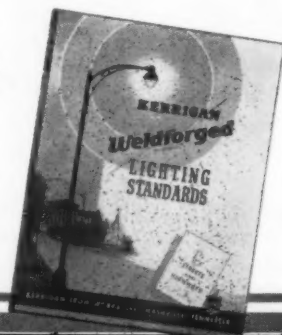
*For Economy & Beauty*



Kerrigan's complete line of brackets and mast arms are carefully engineered for easy installation and wiring. They meet all I.E.S. street lighting recommendations. So, take advantage of your wood poles now in place and brighten up your city or town NOW!

*Let us help you*

solve your city's lighting problems. Send for our FREE catalog containing engineering data. It shows how simple installation really is.

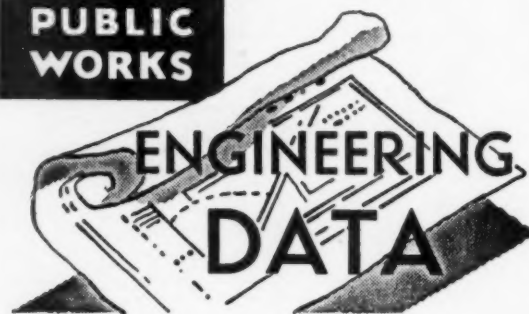


## KERRIGAN IRON WORKS, INC.

Nashville, Tennessee

Gen'l. Sales Office — 274 Madison Ave. — N.Y.C.

**PUBLIC  
WORKS**



### Per Capita Costs of Sewage Treatment Plant Construction

An analysis of costs of sewage treatment plants in Ohio, made by F. H. Waring, Chief Engineer of the State Department of Health, shows the following costs based on 1950 census populations:

Primary treatment plants for cities averaged \$38 per capita; and for villages \$53 per capita. For complete treatment, both primary and secondary, the average per capita costs for cities was \$57 and for villages \$77.

Many plants, especially the more recent ones, are designed for a future population much larger than is now using them; and, in some cases, provision is made for industrial waste treatment from local plants. On the basis of design capacity, per capita costs for primary treatment were \$26 for cities and \$29 for villages. For complete treatment, comparable costs were \$36 and \$53.

### Snow and Ice Control in Wayne County, Mich.

Light snowfalls often create a serious problem in Wayne Co., Mich., as heavy highway traffic immediately packs down light snow and an icy condition results. Salt is applied promptly over the surface of the highway by trucks equipped with mechanical spreaders. These spreaders are powered off the rear wheel of the truck so that the amount of salt deposited on the road is a function of the opening between the ribbed roller and the spreader box and is independent of the actual speed of the truck. Approximately 44,024 tons of salt were used during the winter. It was stockpiled in thirteen strategic locations throughout Wayne County to lessen the distances to critical areas.

### King Sized Highway Picture Facilitates Engineering Study

Number one problem of the Wisconsin Highway Commission is U. S. Highway 41 between Milwaukee and Chicago, 24 miles of the heaviest travelled stretch of roadway in the state. The commission had the area air-mapped and a king-sized mosaic picture produced on which can be seen every road, building and tree. The assembled mosaic measures 9 ft. by 60 ft. and shows 26 miles of road and a 2-mile wide area on either side. With such a picture, which is built in 9-ft. x 4-ft. panels, the engineers can estimate the problems of widening the present highway, of building grade separations or cloverleaf intersections, or of building a whole new road across less developed neighboring fields, right in their offices.

The pictures used in the mosaic were taken on 9-inch film at a scale of 500 ft. to 1 inch. Controlled



## Philadelphia uses ASPLUNDH CHIPPERS TO CUT COST of removing discarded Christmas Trees Number of Truckloads reduced from 10 to 1

According to officials of the City of Philadelphia, a truck formerly hauled only 60 trees to the disposal area. But now, with an Asplundh Chipper, one truck can make the trip with 600 trees.

This modern method of brush disposal represents not only an enormous saving in time and money, but is the cleanest and quickest way to rid the city streets of these fire hazards. And the post-Christmas clean-up is but one of many of your city's brush disposal problems.

Asplundh Chippers are available in three practical sizes—9, 12 and 16 inches. See the tremendous advantages of using an Asplundh Chipper . . . Write today for a free, no obligation demonstration.


### ASPLUNDH CHIPPER COMPANY

505 YORK ROAD  
JENKINTOWN, PENNSYLVANIA




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Need more facts about advertised products? Mail your Readers' Service card now.



**Another  
Modern Pool with  
ADAMS SPF  
FILTERS**

For maximum water clarity, the specifications for this new pool, Horseheads, N. Y., called for R. P. Adams Poro-Stone Filters.

Yes, here's another distinctive pool with the popular Adams Poro-Stone filters. More and more public pools are insisting on Adams Filters, and there are many good reasons why. Here are two of the important ones.

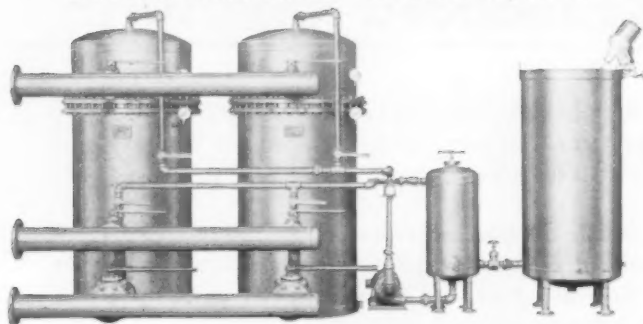
*First*, the exclusive ADAMS HI-FLOW backwash design gives you simple and easy cleaning . . . no messy disassembly . . . no scrubbing of filter elements. The high air dome and unrestricted backwash outlet provide complete purging of the filter tubes with high velocity water.

*Second*, rugged 4 1/4" O.D. PORO-STONE elements with nearly 40% open area are unaffected by corrosion. The first Adams swimming pool filter—in use since 1938—still has the original PORO-STONE tubes.

There are numerous other reasons why it pays to specify and buy Adams SPF filters. Get all the facts by writing for your copy of Bulletin 625. Use the handy coupon below.

### **R. P. ADAMS CO., INC.**

228 EAST PARK DRIVE BUFFALO 17, N. Y.



The Double SPF-129 Poro-Stone filter shown above provides 258 square feet of filter area . . . will handle pools of 371,500 gallons capacity at 774 gallons per minute recirculation flow. It is ideal for outdoor pools such as the 268,000 gallon Horseheads pool.

**R. P. ADAMS COMPANY, INC.**  
228 EAST PARK DRIVE, BUFFALO 17, N. Y.

0-55

Please send me by return mail your new Bulletin 625.

Name.....Title.....

Business.....

Street.....

City.....State.....

Size of pool is.....gallons.

enlargements were made to bring the prints to a 200-ft. to 1-inch scale and to correct errors in scale on the film induced by change of altitude or pitch in the photographic plane during the photography. As the pictures were taken with a 60 percent overlap in succeeding exposures and a 15 percent overlap in the flight strips, the mosaic layers used only the central, most accurate part of each picture. To make the 9 x 60-foot picture, the aerial mapping technicians used 625 pictures. The aerial photography and mosaicing was done by Abrams Aerial Survey Corporation of Lansing, Michigan.

### **Warehouse Facilitates Handling and Storing City Supplies and Equipment**

A 40 by 100-foot sheet metal warehouse has been built in Ukiah, Calif., to provide space for storage and inventory control for municipal supplies. The building was erected at a cost of \$10,500 plus \$2,250 for shelves and other equipment. Items are stored to serve the electric distribution system, the gas manufacturing and distribution system, water supply, sewage disposal plant, airport, golf course and other municipal departments. The shelves and bins in the warehouse have been especially constructed to fit the items to be stored. The warehouse also consolidates all city-owned tools at one location, and departments can draw tools when needed and return them when the job is finished. Stock record cards identify the items, the using departments, the source of supply, cost, and the reorder point on inventory control. Reorder points have been established by department heads, and the warehouseman is responsible for keeping the required stock on hand. In addition to storage areas, the warehouse includes an office, repair rooms for the water and electric departments, a paint storeroom, and a room for police department lost, found and stolen articles—Public Management.

### **Garbage, Rubbish and Ash Collection Costs in Easton, Pa.**

The total cost of collecting garbage and rubbish in Easton, Pa., during 1954, was \$9,3617 per ton. Collections amounted to 8,272.3 tons, compared to 7,584.9 tons the previous year. Detail costs per ton for collection were as follows: Labor, \$6,7171; trucks, \$0.3886; handling at incinerator, \$1.7806; supervision, \$0.2874; and maintenance and operation, \$0.1880. There were also 6,100 loads of ashes collected and disposed of at a total cost of \$39,409.59, of which \$36,485.82 were spent for labor.

### **Booklet for Real Estate Developers Outlines Subdivision Regulations**

A guide for real estate developers has been prepared by Kansas City, Mo. This is a 28-page booklet, prepared in colors. It discusses the problem from a broad viewpoint. Sample preliminary and final plats are included.

### **Cooked Garbage For Feeding Swine**

Studies by Los Angeles Co., Calif., show that the cost of cooking the garbage is approximately 80 cents per ton where a minimum of 60 tons per day is processed. Other tentative findings are that no visible nutritional deficiencies have been found and that the cooking of garbage may increase baby pig production.



# MOBIL-SWEEPER LEADS!



## HERE'S PROOF POSITIVE

Five years of phenomenal sales growth, the greatest of any street sweeper manufactured during this period . . . and it's still climbing at a terrific pace. Such popularity is well deserved because customers have found Mobil-Sweeper Delivers the Performance They Pay For!

### Mobil-Sweeper Advantages:

- Unsurpassed sweeping ability
- Greater mobility
- Lowest maintenance cost
- Unequalled safety
- Proven operating economy

### \* MOBIL-SWEEPER SALES INCREASE PERCENTAGE OVER 1950

1500% INDICATED IN 1955  
BY 1ST HALF SALES



Our large dealer organization throughout the United States and Canada stands ready to show you why Mobil-Sweeper is your best choice.



## MOBIL-SWEEPER

Division of The Conveyor Co., 3260 E. Slauson Avenue, Los Angeles 58, California

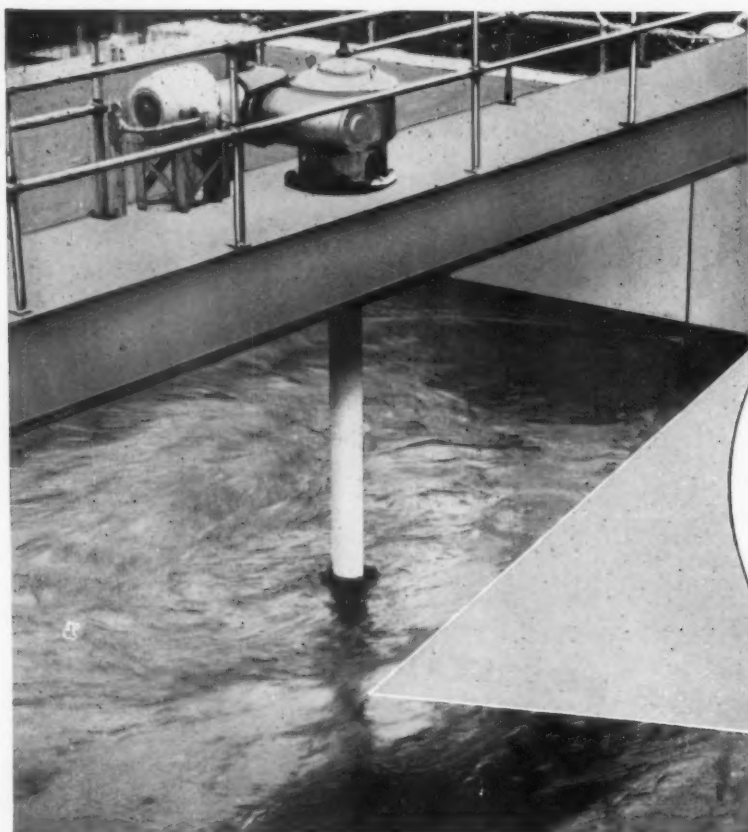
Please send literature on  
Mobil-Sweeper.

PW-10

Name \_\_\_\_\_  
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County \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_

Now's the time to mail this month's Readers' Service card.

# You get better results WITH **INFILCO** EQUIPMENT



**for Mixing  
and  
Flocculating**



**Radial-flow "VORTI" Mixers and VORTI-FLOC® Coagulators, designed by INFILCO engineers, move larger volumes of liquid at lower impeller speeds than other types.**

## Higher efficiency at lower operating cost

"VORTI" Mixers are applicable to most problems of mixing and agitation. The impeller is usually suspended from the top of the basin without the use of underwater guide bearings, stuffing boxes or submerged chain drives.

"VORTI-FLOC" units are used for chemical treatment or for self-coagulation. They create gentle flow and turbulence by moving large quantities of liquid at relatively low velocities, thus promoting coalescence and agglomeration of suspended particles.

By proper combination of speed and size of impeller, applications of INFILCO radial flow units include:

**Slow stirring for equalization**

**Blending of liquids**

**Neutralization**

**Slow stirring for flocculation and agglomeration**

**Rapid mixing of chemicals in liquids**

INFILCO mixers are efficient and economical. Write today for complete details.

**INFILCO INC.** 919 South Campbell Avenue, Tucson, Arizona  
Offices in principal cities in North America

Get full details of this month's products . . . mail your Readers' Service card today.



The one company offering equipment for all types of water and waste treatment—  
coagulation,  
precipitation,  
sedimentation,  
filtration, flotation,  
aeration, ion  
exchange and  
biological processes.

# **TROUBLE-SHOOTING WILL BE NO TROUBLE IN THIS SEVEN FOOT *concrete utility tunnel***

**Bakersfield College**  
Kern County High School  
and Jr. College District  
Bakersfield, Calif.

*Architect*

**Wright, Metcalf & Parsons**  
Bakersfield, Calif.

*Mechanical Engineer*

**Chester D. Walz**  
Los Angeles, Calif.

*General Contractor*

**James I. Barnes**  
Redwood City, Calif.

*Plumbing & Heating Contractor*

**Owen Clark Corporation**  
Bakersfield, Calif.

The quickest, cheapest way to locate and repair utility breaks is to walk right up to the trouble zone and go to work.

That's the way these lines, supplying heat, chilled water, light, and power to new Bakersfield College building, will be maintained.

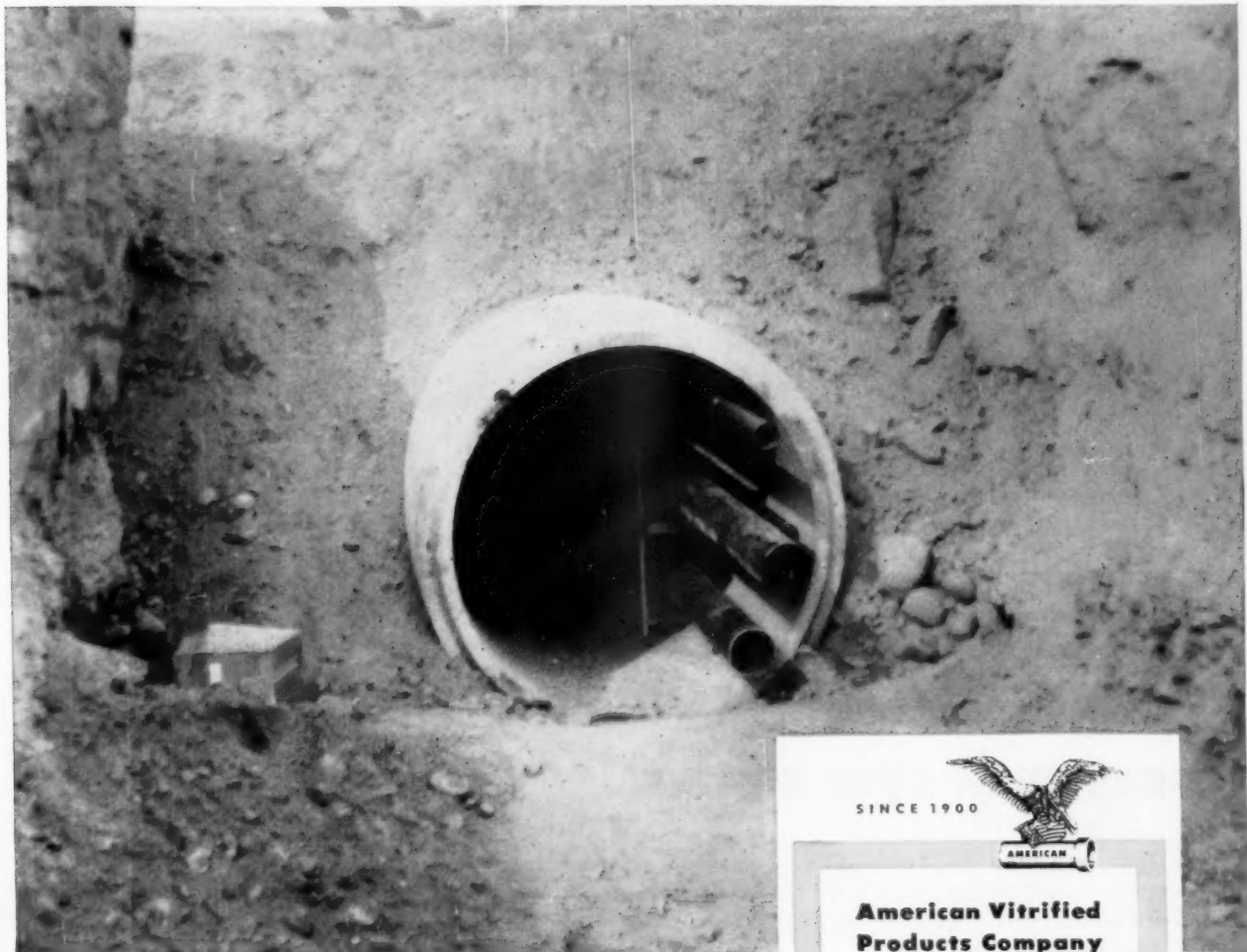
American Vitrified Products supplied several thousand feet of specially manufactured concrete pipe for this project. Steel bands  $\frac{3}{8}$ " thick, 3" wide were welded to the rim cage and wrapped around the inner core so they would be exposed on the inside surface when the pipe was completed.

Supporting brackets, holding the utility lines, were then welded to the bands on eight foot centers.

Complicated assignments such as this are everyday jobs for American. Years of experience and technical know-how guarantee customer satisfaction.

Concrete pipe is just one of the many products manufactured in our plants across the nation. We also produce the new Amvit Jointed Clay Pipe, flue liners—both glazed and unglazed, and clay liner plates.

For more information, write or call American Vitrified Products Co., National City Bank Building, Cleveland, Ohio, or our office nearest you.



*This pipe was specially designed to hold supporting brackets for the utility lines.*

SINCE 1900



**American Vitrified  
Products Company**

CLEVELAND, OHIO

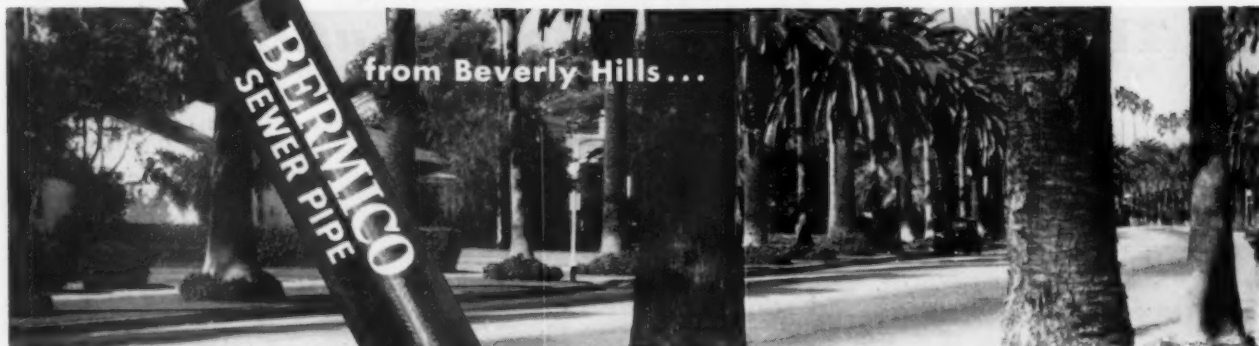
Patent Pending

**Plants Across the Nation**...Brazil, Indiana • Chicago, Illinois • Cleveland, Ohio • Crawfordsville, Indiana • Detroit, Michigan • East Liverpool, Ohio  
Fenton, Michigan • Grand Ledge, Michigan • Lisbon, Ohio • Los Angeles, California • Milwaukee, Wisconsin • South Bend, Indiana • Uhrichsville, Ohio

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# ASK THE CITIES THAT USE IT!



from Beverly Hills...



to Des Moines



to Cambridge

## LEARN WHY

# BERMICO®

## SEWER PIPE

## IS GOING INTO MORE PLUMBING

## CODES THAN EVER BEFORE!

From Maine to California, Canada to the Gulf, sanitary engineers are now authorizing BERMICO bituminized fibre pipe. BERMICO is approved under Federal Specification SS-P-356 and meets all requirements of U. S. Dept. of Commerce CS116-54.

BERMICO's tough wood fibre impregnated with pitch makes it strong, root-proof, corrosion-proof. Its lightweight, 8-foot lengths make for faster, easier installation.

*You can't buy and install root-proof sewer pipe for less! Millions of feet of BERMICO are rewarding property owners across the nation with trouble-free service!*

Your community can take advantage of this "Modern Pipe for Modern Living."

Include BERMICO in your plumbing code.

For details write

Dept. BE-10,

**BROWN**

**COMPANY,**

150 Causeway St.,  
Boston 14, Mass.

Need more facts about advertised products? Mail your Readers' Service card now.

# On YOUR Streets and Highways ... And all Around the World



## The SEAMAN PULVI-MIXER

**Builds Better Bases  
at Lower Cost**



Towns as small as 600 population — and of course cities with several millions of people, find the SEAMAN Mixer builds better bases for a lot less money. Townships with relatively few miles of road, counties and states with big highway programs depend upon the PULVI-MIXER as primary equipment.

And that's true in virtually all the free countries throughout the world. Why?

- The PULVI-MIXER mixes any suitable native material with any binder.
- It mixes in-place to cut material handling cost.

- It *assembles* the materials properly so that coarse aggregates and fines are perfectly blended. Segregation is eliminated. Voids are filled with fines to securely mortar-in the larger aggregates.

- It provides higher densities, higher load-bearing values — and cuts maintenance to a fraction.

- And it operates at the lowest cost per square yard in *any* stabilized construction.

You'll find many more good reasons when you put a PULVI-MIXER to work in your street and highway projects. Call your SEAMAN distributor today.

The story of SEAMAN-mixing is told in detail with many job photos and diagrams. Just jot "Bulletin TPS" on a postcard and mail it — today.



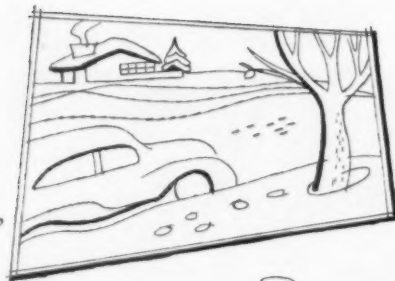
**SEAMAN-ANDWALL  
CORPORATION**

266 NORTH 25th ST. MILWAUKEE, WISCONSIN

Thousands use our Readers' Service card to keep up to date . . . do you?

## What is this?

It's a snow and ice covered street, of course.



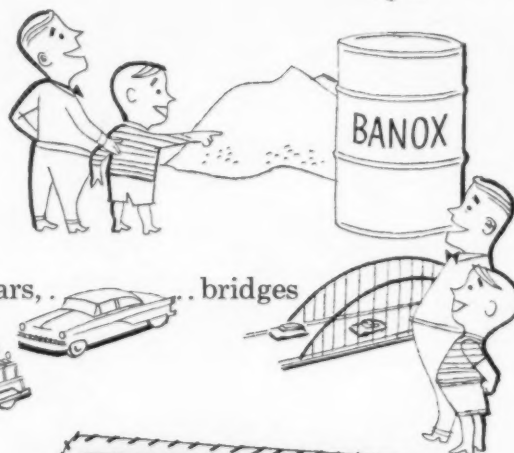
## What's the man doing?

He's spreading a salt and BANOX mixture on the road to make it clean and safe.



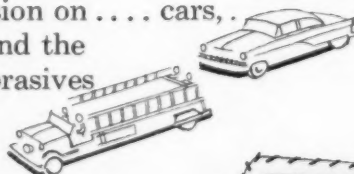
## Why salt and Banox?

Because salt is faster, safer and cheaper than abrasives and BANOX stops salt-slush corrosion.



## What else does the Banox-salt team do?

BANOX stops salt-slush corrosion on . . . cars, . . . bridges and municipal equipment . . . and the use of salt is less costly than abrasives and saves expensive spring clean-up of gutters and sewers.



## Who are all the happy people?

They represent the people of a community who are delighted with the clean streets and fewer accidents assured by BANOX and salt.

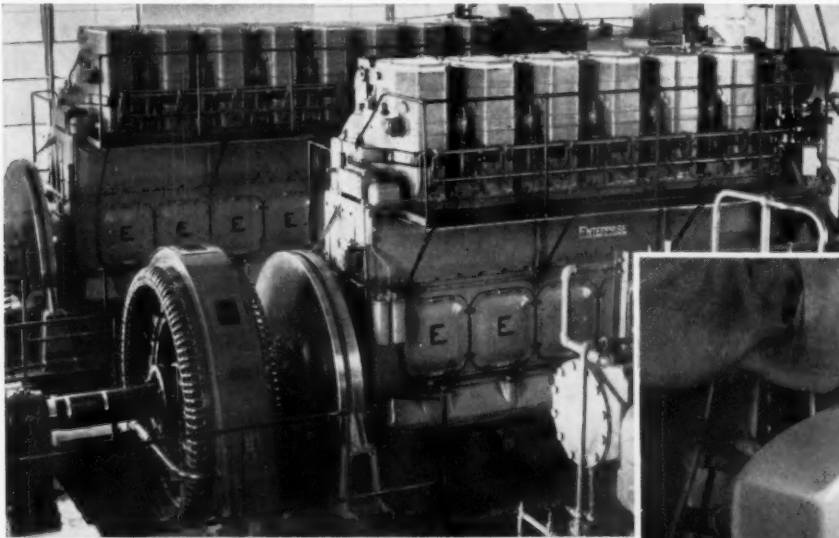


A pound of BANOX for every hundred pounds of salt is all that is needed for rust-free snow and ice control in your community. No special mixing is necessary. Banox is spread evenly by normal traffic flow. Write to us for more information about the effectiveness of BANOX and salt. We'll send you our *free booklet*: "Stop, Look and Save with BANOX."

**calgon, inc.** HAGAN BUILDING  
PITTSBURGH 30, PENNA.

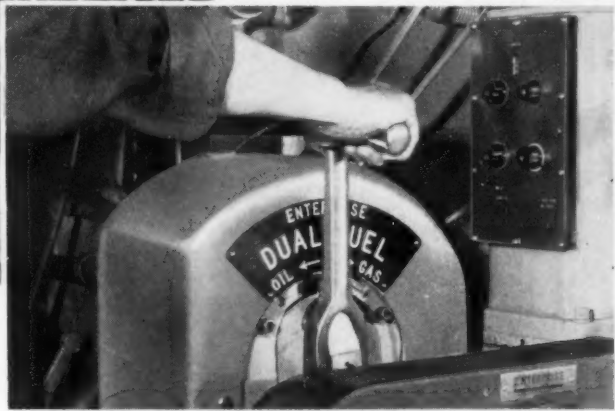
Now's the time to mail this month's Readers' Service card.





The two Enterprise Diesels were equipped for "Select-O-Matic" Dual Fuel operation in the field after installation, taking full advantage of low-cost gas for fuel.

A single lever simplifies fuel selection. After manual setting, any fluctuation in gas pressure is compensated for automatically, thereby maintaining constant engine speed and load.



## City of Broken Bow, Nebraska, Switches to Enterprise Dual Fuel—Saves \$36,000 a Year!

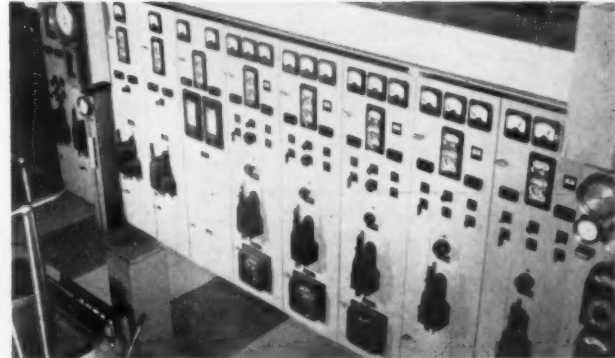


Broken Bow's model municipal utility plant is under the capable supervision of L. E. Clark. "These Enterprise Engines have given us exceptional performance in every way," says Clark, "we're more than satisfied with their excellent record."

Electricity comes cheap at Broken Bow, Nebraska, where two Enterprise "Select-O-Matic"® Dual Fuel Engines, running on natural gas with pilot oil, have cut \$100 a day in fuel costs since their installation three years ago. Because of their low cost operation, they have virtually replaced the three original engines, which are now used for standby and peak load service only.

Intercooling boosts output. Even though Broken Bow's summer and winter temperatures vary greatly, the Enterprise Engines, through Intercooling, run at full load with no increase in temperatures or pressures. The result is greater KW output and economy.

The real payoff has been in greatly reduced electric rates, and a modern, dependable power plant that has paid for itself and is contributing to the general improvement fund.



Modern control panel keeps tab on plant production. A unique "Metered Maintenance" plan developed by Mr. Clark keeps operating and maintenance costs at a minimum.

Get full information on Enterprise Engines today. Units from 73 to 6933 HP in Diesel, Dual Fuel, Tri-Fuel, Spark Ignited Gas—for every stationary, municipal, and marine use.

*Over a million horsepower at work the world over!*

# ENTERPRISE

*dependable* **ENGINES**

ENTERPRISE ENGINE & MACHINERY CO.  
Subsidiary of General Metals Corporation  
18th and Florida Streets, San Francisco 10, California  
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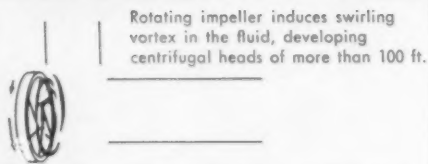
Get full details of this month's products . . . mail your Readers' Service card today.

*at last!*

## a 100% NON-CLOGGING SEWAGE PUMP



### Here is how it works



Rotating impeller induces swirling vortex in the fluid, developing centrifugal heads of more than 100 ft.



Vortex extends into feed line — not unlike the waterspout of a hurricane.



Fluid and solids begin swirling even before they enter the fast vortex within the pump.



Centrifugal force discharges most solids in less than one revolution. Seldom do they touch the impeller.

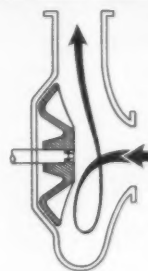
### THE WEMCO TORQUE-FLOW SOLIDS PUMP

Rags, stringy fibrous materials and thick sludges can flow through this pump indefinitely without accumulating or clogging. Bar screens can be eliminated — pump inspection periods can be lengthened — and messy pump teardowns become almost a thing of the past.

### FIELD PROVEN BY LOS ANGELES COUNTY SANITATION DISTRICT

A "hand made" early model Wemco Pump was installed on a 90 day trial pumping raw settled sludge. Previous modern pumps had been ragging-up in excess of four times per week. The trial period was completely successful. Not a single stoppage occurred. Even this hand made model is still in continuous operation after more than fourteen months. This resulted in many additional pumps being installed at other critical points in the system.

### COMPLETELY NEW IN CONCEPT



Success of the Wemco Torque-Flow Solids Pump is due to its unique new principle. Nowhere is its flow passage narrower than the discharge — and there are no rag catching projections, corners, or edges. The impeller is recessed from the main flow. It pumps by inducing a vortex and swirl. It will create suction lifts greater than 20 feet or pump heads of 100 feet and more.

Write for full particulars to Dept. M-20-45

# WEMCO<sup>®</sup>

WESTERN MACHINERY COMPANY

760 FOLSOM STREET • SAN FRANCISCO 7, CALIFORNIA

50 CHURCH STREET • NEW YORK, NEW YORK

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REPRESENTATIVES IN PRINCIPAL CITIES OF THE UNITED STATES AND CANADA AND IN MAJOR COUNTRIES THROUGHOUT THE WORLD

Now's the time to mail this month's Readers' Service card.

# STOP THOSE LEAKS!

## DON'T WASTE YOUR PRECIOUS WATER!

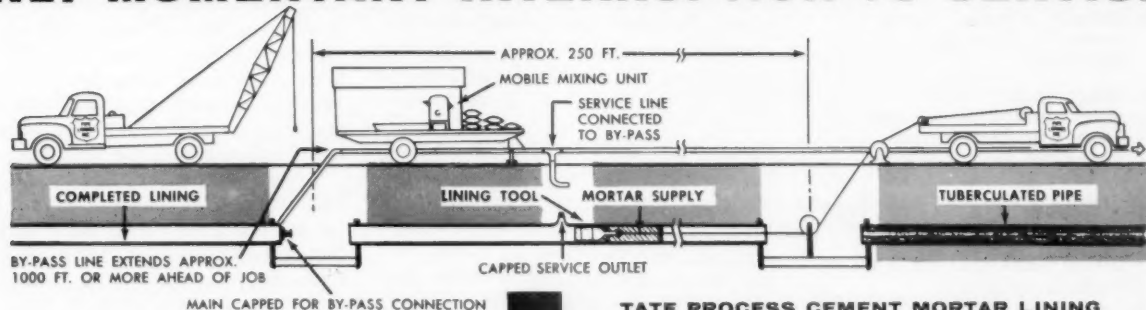
Little leaks *do* lead to big losses. If your lines look like this...or only partially resemble the illustration...you need a leak-stopping cement-mortar lining inside your lines. Easily applied...quickly applied...economically applied by Pipe Linings, Inc. . . specialists in cement mortar lining of the interior of pipelines "in place" by the Tate Process.

LOOK HOW LITTLE  
LEAKS LEAD TO  
BIG LOSSES

Diameter of Opening*	Gallons Lost Each Year
1/32	76,000
1/16	300,000
1/8	1,200,000
3/16	2,700,000
1/4	3,600,000

\*At 60 lbs. pressure (orifice formula)

## ONLY MOMENTARY INTERRUPTION TO SERVICE!



The economical way to line pipe 4" to 16" in diameter "in place"! A temporary pipeline laid parallel to the existing pipe serves the customer while work is being done. The existing pipe may be cleaned and lined at a rate of approximately 750 feet per day. Cement mortar linings normally 3/16" to 1/4" thick are applied at a pressure of approximately 100 pounds per square inch. Leaks are stopped . . . water loss is eliminated . . . operating costs are reduced.

WRITE TODAY on your organization letterhead, for the new 12 page color catalog Cement Mortar Lining of Pipelines "In Place." Contains complete explanation, application photos, specifications for work done by the Tate Process.



### TATE PROCESS CEMENT MORTAR LINING FOR PIPELINES 4" TO 16" GIVES YOU . . .

New pipe performance • Prevents leakage • Restores full flow coefficients • Reduces pumping and maintenance costs • Protects against corrosion, contamination and water discoloration . . . at much less than the cost of installing a new line.

Note: Pipe Linings, Inc. lines pipe 16" to 144" in diameter economically too . . . using the Centrifugal Process.

## PIPE LININGS, Inc.

Specializing in Pipe Protection Problems • Interior Cement Mortar Lining • Somatic® Exterior Pipe Protection • Pipe Wrapping • Centrifugal Spinning of Cement Mortar Linings in Plant • Pipe Reclamation

2414 E. 223rd St., Wilmington, Cal. • P. O. Box 457, Wilmington, Cal.,  
Phone NEVada 6-1771 • Rail Address: Watson, Cal.

Need more facts about advertised products? Mail your Readers' Service card now.

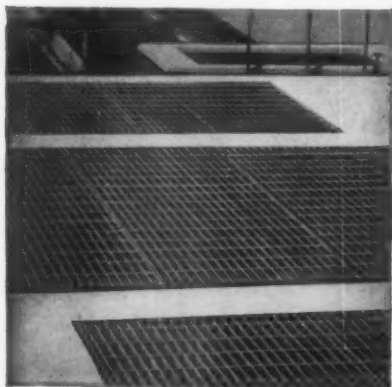


## KEEP in STEP!

... Take Advantage of  
**SAFETY,  
ECONOMY,  
DURABILITY,**  
Every Step of the Way.

## ... CHOOSE IRVING GRATINGS

You're on SURE FOOTING with  
Versatile IRVING RIVETED,  
WELDED OR PRESSURE-  
LOCKED OPEN MESH  
FLOORING...



**FOR:** Walkways, Catwalks, Flooring,  
Draingrates, Stairways,  
Stair Treads.

**IN:** Sewage Disposal Plants,  
Water Treatment Works, Power  
Stations, Bus Laundries, and  
other Public Works Installations.

### Specify IRVING GRATING for:

- ★ Light Weight
- ★ Simple Installation
- ★ Self-Draining Features
- ★ Self-Ventilating Qualities
- ★ Minimum Maintenance Cost
- ★ Custom-Built Perfection
- ★ Prompt Delivery
- ★ Safety ★ Durability

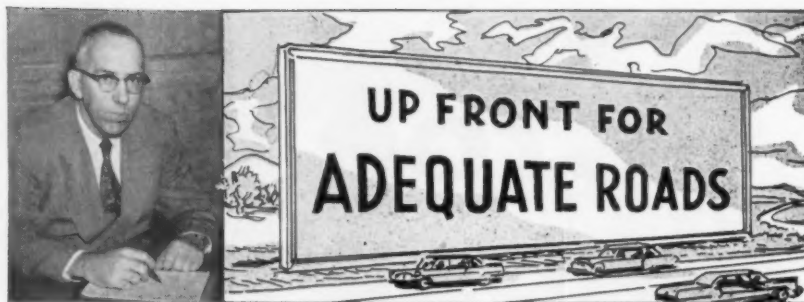
"A Fitting Grating for Every Purpose"

Ask for Illustrated Catalog

**IRVING SUBWAY  
GRATING CO., INC.**

ESTABLISHED 1902

OFFICES and PLANTS at  
5053 27th St., Long Island City 1, N. Y.  
1853 10th St., Oakland 20, California



by LEO J. RITTER, JR.

**Stocks and Bonds**—A very neatly done, interesting booklet is one recently released by Merrill Lynch, Pierce, Fenner & Beane, 70 Pine Street, New York 5, N. Y. The booklet is entitled "Roads and Investors". Yes, That's right—the book is put out by one of the leading stock brokers and investment houses in the country. Among other things, it contains analyses of the stocks of many of the leading highway equipment and materials producing companies. If you have some money to invest (or if you haven't) you'll find this interesting reading. Meanwhile, a recent issue of *Business Week* reported the postponement of the issue of \$40 million of expressway bonds by Cook County, Illinois because interest rates submitted by bidders were too high (low bid, 2.69%). In July a \$125 million bond issue by the New York State Thruway was withdrawn for similar reasons. Late in August, underwriters told the Oklahoma Turnpike Commission that "market conditions now were not appropriate" for the sale of \$80-million worth of bonds. Reasons cited by the underwriters were (1) an oversupply of turnpike bonds now on the market and, (2) recent curbs on credit by the federal government. During the same week, the price of West Virginia Turnpike bonds dropped sharply to an all-time low of 82 bid. What does this all mean? Simply, that rough times may lie ahead for the sale of bonds of this type, except for projects which have a high benefit-cost ratio, and a definite increase in the cost of borrowing money for these purposes. Both are factors which may tend to delay the start of some new turnpike projects until more favorable financing conditions exist.

**Federal-Aid Airport Program**—An accomplishment of the recent Congress was the passage of a new Federal airport law, approved by

the President early in August. The law authorized an additional expenditure of \$42.5 million (\$20 million already available) during this fiscal year. The law further authorizes a level of \$63 million for federal grants for each of the next three fiscal years. Not only is this the largest federal-aid program for airports in history, but it is the first time that provision has been made for development of the national airport program on a long-term basis. Many cities and other governmental groups are expected to use this aid to implement long-range development plans which have been stymied for lack of funds.

Programming of the original \$20 million available for this fiscal year has been completed. Projects under this portion of the program are programmed in every state, with local governments matching federal funds. Projects are many and varied, ranging from as low as \$5,680 to Clinton, Iowa, for construction of a taxiway and extension of an entrance road, and \$5700 to Watertown, South Dakota, for a similar purpose, to projects of \$300,000 each for improvements to major airports in 17 cities across the country.

Programming of the additional \$42.5 million available this year will be delayed until about the middle of November in order to give local agencies an opportunity to review their plans and present new or amended applications based upon the level of funds now available. For the benefit of airport sponsors and others, the following are the addresses of CAA regional offices in the continental United States: *Region 1*—Federal Building, New York International Airport, Jamaica, Long Island, New York. *Region 2*—PO Box 1689, Fort Worth 6, Texas. *Region 3*—911 Walnut Street, Kansas City 6, Missouri. *Region 4*—5651 West Manchester Avenue, Los Angeles 45, California.

**Vacationeering**—As usual, we went motoring again this summer, spending most of the time in northern

The advertisement features a central illustration of a road with cars, flanked by two callout boxes. The left box shows a stack of license plates from 1955 to 1985 with the text "...for longer road life". The right box shows a car with the text "...for better road performance". A stream of rubber pellets falls from the top center onto the road. The main title "Surfa-SEALZ" is prominently displayed in the center, followed by the subtitle "-Handy Rubber Pellets for 'Rubberized Roads'" in a large, bold font. Below the title, a large pile of rubber pellets is shown on the road surface.

Without special equipment, Surfa-SEALZ Pellets make it easy to use rubber in *any* hot mix plant—make rubber pavement available for *every* job. Surfa-SEALZ Pellets (concentrated synthetic rubber in a dry form) are easily handled. Tossed into a mixing mill, they disperse rapidly, spreading rubber evenly through the mix, and once blended, they do not separate.

**Surfa-SEALZ lengthens road life by...**

**MINIMIZING RUTTING!** Surfa-SEALZ increases the viscosity of asphalt greatly reducing the tendency to flow under pressure.

**REDUCING BRITTLINESS!** Surfa-SEALZ's rubbery, highly resilient nature reduces asphalt's tendency to become brittle at low temperatures.

**Surfa-SEALZ increases road performance by...**

**INCREASING SKID RESISTANCE!** The bleeding of asphalt to the surface is one of the greatest causes of slippery highways. Surfa-SEALZ counteracts this tendency of asphalt to bleed.

**REDUCING STRIPPING!** Surfa-SEALZ helps prevent the penetration of water which is responsible for separating the stone from the asphalt binder.

**STRENGTHENING ADHESION!** With its tenacious, flexible bond, Surfa-SEALZ strengthens the bond of asphalt to aggregate.

Rubber-bituminous concrete made with Surfa-SEALZ Pellets needs no special equipment to mix or lay. And Surfa-SEALZ® adds only about \$2.00 to the cost of a ton of mix!

For longer life and better performance in the surface courses *you* lay, better get in touch with Naugatuck today.



# Naugatuck Chemical

Division of United States Rubber Company  
Naugatuck, Connecticut



BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • Memphis • New York • Philadelphia • IN CANADA: Naugatuck Chemicals, Elmira, Ontario  
Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latexes • Cable Address: Rubexport, N. Y.

Thousands use our Readers' Service card to keep up to date . . . do you?

Colorado and the Black Hills of South Dakota. A few of my impressions may be of interest. First, isn't it wonderful to live in a country like ours, where you can move around so freely and, in general, travel on pretty good roads? We were impressed with the many improvements made in the Denver area, particularly the Valley Highway. The scramble system has really caught on in the Rocky Mountain region (originated in Denver); even the little towns are using it. For example, Estes Park, which has only one traffic light, has that one light

on the scramble system—we noticed others in Cheyenne and Rapid City, South Dakota. The Black Hills region has generally adequate roads now, although many of them are curving and narrow; there are a number of "pig-tail" (curving) bridges, which are a little novel. One of the most interesting roads we've been on for some time is "Horse Thief Road", which is a two-lane gravel road going up over the mountains from the Sylvan Lake region to Mount Rushmore—part of it is a divided highway, with a wide strip separating the two lanes of

travel. There now is a very nice scenic route right through the heart of the "Big Badlands" in South Dakota. Another beautiful drive is Wisconsin 35, from LaCrosse to Prairie Du Chien, which goes right along the banks of the Mississippi.

#### **Traffic Safety in Washington State—**

The remarkable record being made in traffic safety in Washington state was the subject of an interesting article in the *Kiwanis Magazine* last July. Washington won the grand award in the National Safety Council's 1954 traffic safety contest, primarily because of a marked reduction in traffic deaths in the state in 1954, as compared with 1953. The decrease amounted to an amazing 21 per cent, with only 419 persons meeting death on the state's 55,000 miles of highways in 1954, as compared with 533 in 1953. Heart of the program has been a rigid enforcement of state traffic regulations by the state highway patrol. Among the enforcement methods now being used in Washington are the following:

(1) Four helicopters patrol certain highways, sending word of reckless driving by radio to waiting patrol cars below.

(2) Eight spotter planes, some of which are equipped with PA systems, fly low over congested areas and dangerous intersections to blast out warnings to jaywalkers or to report driver violations.

(3) Patrolmen have developed effective hide-out techniques to spot violators, with the use of unmarked patrol cars, even convertibles, being common.

(4) Patrolmen in unmarked cars take pictures of hard-to-prove violations, such as going through red lights, passing on curves, etc.

(5) Radar speed meters are used to detect and prove speed violations.

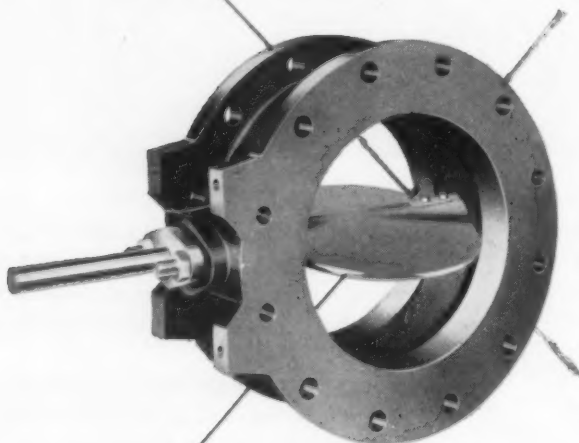
(6) Combined teams of state patrolmen and city and county police stage periodic mass checks, where groups of vehicles are ordered to stop for examination, and saturation patrols, in which a covey of police cars blanket a highway area and stop every moving violation.

(7) Strict enforcement of winter driving regulations, close checking of driver license qualifications, severe prosecution of drunken drivers, increased arrests for pedestrian violations, and a stepped-up educational program are also being carried on.

The new program met with many complaints at first but, as the accident rate and death rate dropped,



**For water works  
service...specify  
AWWA standard  
butterfly  
valves...**



**... by  
Builders-Providence**  
356 Harris Ave.,  
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DIVISION OF B-I-F INDUSTRIES, INC. METERS  
BUILDERS IRON FOUNDRY • PROPORTIONERS, INC. • OMEGA MACHINE CO. FEEDERS  
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Get full details of this month's products . . . mail your Readers' Service card today.





**UNITED STATES CONCRETE PIPE...**

★ **LENGTHENS LIFE** ★ **REDUCES COST**

**of Concrete Waste Disposal Lines**

**PROJECT:** Anacostia Trunk Sewer  
—Tuxedo District of Prince Georges' County, Maryland.

**ENGINEERS:** Whitman, Requardt & Associates, Baltimore, Maryland, for Washington Suburban Sanitary Commission, Hyattsville, Maryland.

**CONTRACTOR:** Intercounty Construction Corporation, Hyattsville, Maryland.

**PIPE:** Manufactured by United States Concrete Pipe Company — 72" Reinforced Concrete Culvert Pipe in 8' lengths.

**JOINTS:** TYLOX Type H Rubber Gaskets, manufactured by Hamilton Kent Manufacturing Co., Kent, Ohio.

In more and more sewerage and drainage jobs where concrete pipe is required, UNITED STATES Concrete Pipe is being supplied with TYLOX Rubber Gaskets. Typical of this trend is the project shown above. Rubber Gaskets were specified because it is known from experience how they help to cut cost, lengthen life and reduce maintenance of concrete sewers and drains.

Among many PLUS features which have helped earn confidence for our Pipe, three special advantages stand out . .

**GREAT STRENGTH** — exceeds A.S.T.M. and all other official specifications. It safely withstands shock, soil stresses, overburdens.

**DENSE STRUCTURE** — resists corrosion, tuberculation, electrolysis . . provides greatest hydraulic efficiency.

**LOW COST** of installation, and in future operation and maintenance of the line.

If you are planning a job for concrete pipe, contact our nearest sales office for more details on Tylox-Jointed United States Concrete Pipe. Read the facts . . then *specify* "UNITED STATES" to assure lower construction cost and longer life of *your* concrete pipe projects.

#### PRODUCTS

Vitrified Pipe and Fittings, Concrete Pipe, Vitrified Liner Plates, Ship Lap Wall Coping and other Clay Products.

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**CONCRETE PIPE COMPANY**  
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M-SCOPE

Outperforms any pipe locator on the market regardless of price or design! Fully GUARANTEED:

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- Completely new electronic circuit—no wound antenna loops—no beat oscillator.
- Traces farther and more accurately.
- Greater receiver sensitivity—no outside interference.
- 50% less "B" battery consumption.
- Built-in Battery Checker available.



**Only \$162.50**

with indestructible Fibreglas cabinets.

Send for FREE Manual  
"Special Pipe Finding and  
Leak Detecting Techniques".

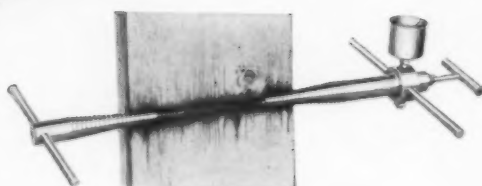
FREE Instrument Catalog

## FISHER

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PALO ALTO, CALIFORNIA

Geophysical Instruments Since 1932

## Greenlee Bolt Hole Treaters



### assure maximum life for poles, piles, timbers

Prevent decay around holes bored in new or old poles and timbers by pressure-treating each hole bored in the field. It's a simple operation with a GREENLEE Bolt Hole Treater. Treats the entire hole... forces preservative into all the wood cells around the bolt hole. Simply pour preservative in Treater cup until hole and cup are full. Pull back on handle, spring return does the work. Two models. Write for details. Greenlee Bros. & Co., 1750 23rd Avenue, Rockford, Illinois.



so did the complaints. Washington is making a truly remarkable record and leading the way in traffic safety. What one state can do, others can.

**From Here and There** — The Florida Turnpike Authority will begin receiving paving bids this month on the "bobtail" turnpike, from Hollywood to Fort Pierce. Pennsylvania finally got on the ball and raised its local limit (gross weight) on tractor and tandem-axle semi-trailers from 45,000 to 60,000 pounds. The Missouri Highway Commission has put into service a "homemade" mobile soils laboratory. The silver anniversary meeting of the Institute of Traffic Engineers will be held in Pittsburgh, October 23-27. The University of Missouri has received \$16,000 from the State Highway Commission for a one-year cooperative research program. President Eisenhower has signed a bill authorizing the expenditure of \$75 million to complete the Inter-American Highway in three years (from Laredo, Texas to Panama). The city commission of Mobile, Alabama, has announced plans to sell \$17 million in bonds to finance a street improvement program.

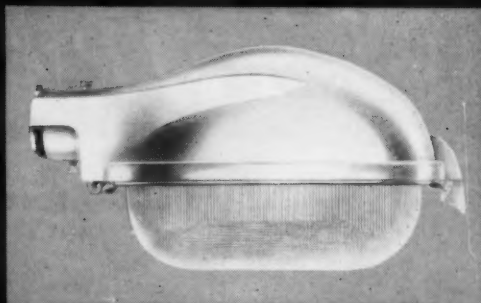
**People and Stuff** — Louis A. Fraleigh, Jr., has been temporarily appointed as executive director of the Florida State Road Department; this is a new post, created by the 1955 legislature in an attempt to take the politics out of road building. Representative Fallon, Chairman of the House Subcommittee on Roads, has been quoted to the effect that he does not expect passage of major highway legislation for at least two years; others disagree. Dwight Bray, State Highway Engineer of Kentucky, recently returned from an assignment with the World Bank in Peru and Washington, D. C. Bill Dickinson has been named Chief Engineer of the Calcium Chloride Institute. C. L. Motl, long-time chief maintenance engineer of the Minnesota Highway Department, has resigned to become a consultant on highway maintenance problems in Egypt (no frost action there). Henry Aaron, formerly of the CAA, has become Highway and Airport Engineer of the Wire Reinforcement Institute.

### Parking Meter Revenues

Since installation in 1949, parking meters in Spooner, Wisconsin, have yielded \$44,278. Meter repairs and expenses have been \$2,935.

Need more facts about advertised products? Mail your Readers' Service card now.

A typical example of Westinghouse street and tunnel lighting. OV-20's in the foreground, FU-72 luminaires in the tunnel.



## Why Seattle specified Westinghouse OV-20 luminaires on their new freeway

**Problem:** Select a street light that would give Seattle drivers the best possible night visibility on the new Alaskan Freeway and smooth good looks by day. A point-by-point analysis showed Westinghouse OV-20 mercury luminaires to have these qualifications as well as the following superior mechanical construction and maintenance features.

**One-piece cast aluminum housing**—adds rigidity and weather resistance to the OV-20.

**New optical system**—New reflector and refractor design improves distribution of light along the street.

**Weatherproof seal**—between the housing and glassware, holds cleaning to a minimum.

**One-hand maintenance**—Cleaning, washing and relamping can be done without tools, and without ex-

posing the wiring or damaging the stationary reflector. Open-type latch makes it impossible to drop glassware while cleaning.

**Smooth good looks**—Mounted on either concrete or metal poles, the modern unbroken design of Westinghouse mercury luminaires adds a progressive appearance to large communities and small.

And the Westinghouse OV-60, second member of the mercury family, gives wide streets better visibility and greater uniformity of pavement brightness—with all the plus features of the OV-20.

Be sure you specify Westinghouse OV-20 mercury luminaires—the original mercury street light—copied in general appearance but never duplicated in performance. More information? See your nearby Westinghouse representative.

J-04380

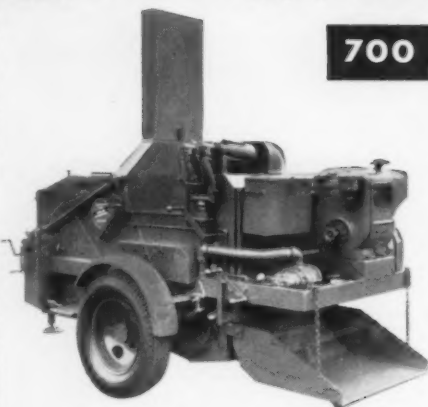
YOU CAN BE SURE...IF IT'S  
**Westinghouse**



Thousands use our Readers' Service card to keep up to date . . . do you?



# Now 2 great new Littleford all-weather TRAIL-O-PATCHERS


**700**

- 7 TPH hot mix
- 12 TPH cold mix
- 7 cu. ft. capacity
- 200-gal. bitumen tank
- metering system
- aggregate drying compartment

The first self-contained all-day all-weather bituminous mixer. Easy to operate, highly portable. Send for bulletin EE-28.


**400**

- 4 TPH hot mix
- 8 TPH cold mix
- 4 cu. ft. capacity
- low cost
- high speed single action trailer
- twin pugmills

The first low cost 4-cu. ft. capacity all-weather bituminous mixer. It's compact and solid, highly portable. Send for bulletin FF-29.


**LITTLEFORD**

LITTLEFORD BROS., INC.  
452 E. Pearl St., Cincinnati 2, Ohio

**Your choice:** Whichever you choose—700 or 400—it will be your best buy . . . because both are Littleford engineered throughout for highest quality.

## A new trend in municipal water filtration — The SPARKLER DIATOMITE FILTER MODEL SCJ has been highly successful in installations now in operation

Reduced operating cost due to long filtering cycles and fast backwash cleaning, together with a remarkably low bacteria count requiring a minimum of chlorination, are features that make this new type filter worthy of the attention of all waterworks engineers.

With every backwash cleaning, the used filter cake is washed out with the residue, and a fresh pre-coat of diatomite applied to the filter plates, providing a completely new sanitary filtering media with each cleaning.

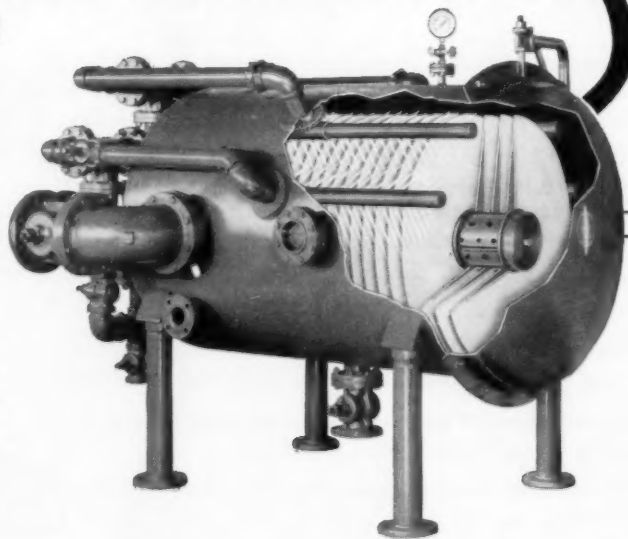
This filter removes all silica, sand, algae, organic matter, silt, etc., from the raw water, and bacteria is reduced up to 80% and even more in some cases. The high quality of water obtained will raise the standard of water produced by some municipal water systems now using old methods of filtration.

Practically any volume of city water can be filtered economically in the Sparkler SCJ filter. Single units capable of handling 5,000,000 gallons of water a day are available. Multiple units can be engineered into a system for larger requirements.

Less than 0.2% of water is required to backwash and clean the largest filter units and a complete fresh precoat of diatomite can be applied and the filter ready to resume operation in 15 minutes.

Operators can be easily trained, no highly skilled specialized personnel is required to insure efficient performance.

Write for plans and prices on your requirements. Address Dan Baldwin for personal service.


**SPARKLER MANUFACTURING CO.**

Home office and plant, Mundelein, Ill.  
SPARKLER INTERNATIONAL, LTD.

Plants at Galt, Ontario, Canada

Amsterdam, Holland

Manufacturers of industrial filters for over a quarter of a century.

Now's the time to mail this month's Readers' Service card.

# PUMPING PROBLEMS? BRING THEM TO



# BJ



## BJ SUBMERSIBLES

Byron Jackson manufactures all three basics of a submersible... the PUMP... the SEAL... and the MOTOR... and combines them in BJ Submersibles and Subettes. Complete range of sizes and types. Capacities range from 30 to 20,000 gpm, and heads up to 1800 ft. BJ Submersibles can be applied to all deepwell problems.

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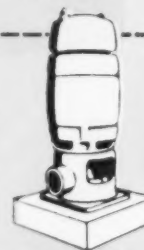
Complete pumping stations can be placed underground, under streets, parks, etc. Eliminate real estate investment and economically boost pressure for sub-division expansion, etc.

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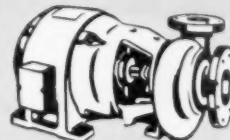
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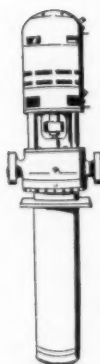
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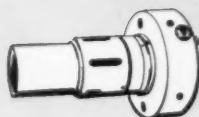
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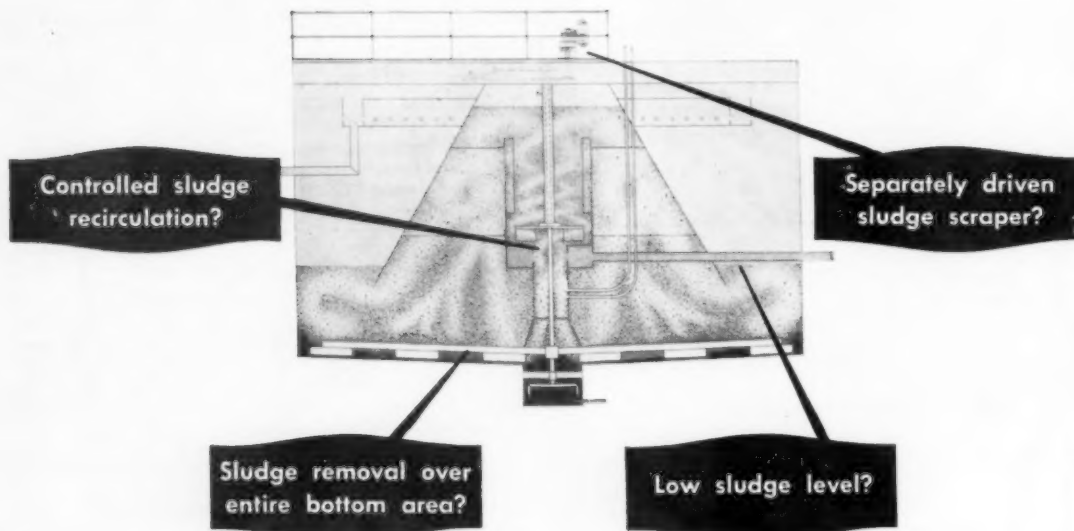
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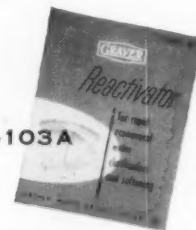
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*Circled area shows 40' digester with PFT Floating Cover*

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Carol City  
now equipped with  
privately owned  
sewage treatment plant



With 10,000 houses scheduled for construction in three years, Carol City ranks as Florida's largest housing project and one of the fastest growing cities of recent years. Its privately owned and operated activated sludge plant will grow at the same rapid pace and is expected to serve 40,000 by 1957. Using modern materials throughout, Carol City chose PFT equipment for effective "controlled digestion."

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plified because no fixed levels need be maintained—the cover simply rises or lowers with additions and withdrawals.

*Floating Covers* also reduce explosion hazards because gas collected under the cover is maintained at positive pressure under all operating conditions. Costly breakdowns are reduced because all moving parts are eliminated from inside the digester.

A *PFT Waste Gas Burner* was installed to prevent odor nuisance and burn off *safely* all excess gas produced in the digester.

PFT assured the successful operation of Carol City's equipment by

checking the installation and instructing plant personnel in the proper methods of operation.

*Design of plant by / Clifford, Cooper & Associates, Inc. Miami Springs, Fla.*

waste treatment equipment exclusively since 1893



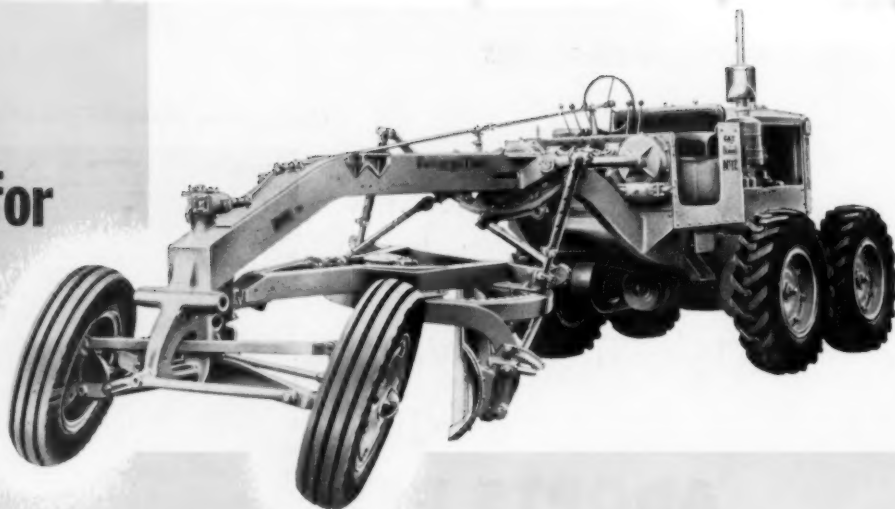
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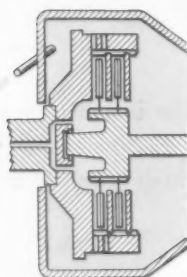
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Motor Grader  
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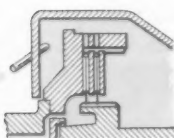


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### How the new oil clutch works



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As clutch discs move to engaged position, facings are "oil protected." Once engaged, they are completely free of oil.



Cork facings have a network of grooves that enable oil to escape during engagement. Oil constantly lubricates all moving parts.

**E**xtensive tests have shown that clutch facings wear an average of only  $2\frac{1}{2}$  thousandths of an inch per thousand hours of operation with the new oil clutch for the Caterpillar No. 12 Motor Grader. Here are four good reasons why this new oil clutch can mean lower cost, better performance on *your* job:

- 1 LONG LIFE:** new clutch facings greatly extend clutch life by reducing slippage. This is possible because of the high frictional qualities of the bonded cork facings. Since the clutch runs in oil, constant "oil bath" lubrication cuts wear on moving parts.
- 2 GREATER EFFICIENCY:** clutch action stays smooth and "like new." Clutch "fade" due to overheating is practically eliminated, since facings are kept cool by engine oil.
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**99% OF ALL  
CAT MOTOR GRADERS  
ARE STILL IN USE**

# Lighting

## for a Sewage Treatment Plant

**T**HE LIGHTING PROBLEM for a sewage treatment plant is in many ways identical to the lighting problem for any other industrial plant. Similar offices, pump rooms, shops, power house, laboratory, streets and fencing are found in many places. Treatment tanks, sludge digesters and driers only are unique to the sewage plant. Sewage releases several gases, one of which is highly corrosive (hydrogen sulfide), the other of which presents an explosive hazard (methane), also many sewage plants are on the seaboard where the salt air is an additional corrosive agent. These conditions dictate that lighting fixtures should be dust tight and vapor-proof, except in offices and other warm, dry locations. Besides being resistant to corrosion, these fixtures are easy to service and clean. The lighting circuits should be oversize so larger lamps or additional units can be simply installed at a later date if required.

## Plant

**H. M. HAYS**

Electrical Engineer,  
Los Angeles Bureau of Sanitation

The high-bay and low-bay fixtures used almost universally at Hyperion are of the Crouse-Hinds type MDS-16. Dust and vapor tight units are, of course, made by other reputable companies. "High-bays" are mounted 25 or more feet above the floor, and "low-bays" are mounted about 12 feet. Lighting units should be spaced so the light overlaps (0.5 to 1.0 times mounting height). The type used depends on ceiling height, high-bays being installed where possible, as not as many are required. Since illumina-

tion decreases inversely as the square of the distance from the light source, a highbay installation uses larger lamps spaced at greater distances, as compared to a low-bay installation. High-bays concentrate the light more than low-bays (to minimize light loss due to interception), so they are not spaced quite so far apart proportionally as low-bays.

**Design**—For the man who is going to plan the lighting layout for any plant, I highly recommend the booklet "Lighting for Industry", published by the Holophane Co., 342 Madison Ave., N. Y. 17. Several of the large manufacturers of lamps and fixtures distribute literature on lighting which is useful. The American Standards Association's "American Standard Practice for Industrial Lighting" is an excellent reference, especially for the lighting engineer. A copy can be obtained for 50¢ from the Illuminating Engineering Society, 1860 Broadway, N. Y.

● **DAYTIME** view of the Hyperion activated sludge sewage treatment plant, Los Angeles, Aeration tanks in foreground.

● **NIGHT** view from same location as picture at left. For this photo, an exposure of 5 seconds was used with f of 5.6







● LIGHTING for settling tanks is provided by 250-watt mercury vapor lights spaced at 30 ft., and mounted 14 ft. high, providing 2 fc along the walkways.

The human eye is very adaptable and readily adjusts to lighting values over a wide range, but as the illumination goes down the eye's ability to discern detail decreases. I.E.S. recommendations for proper lighting cover most industrial applications. In general, a lighting level of 10 fc is the minimum recommended for indoor work; in hallways, 5 fc is sufficient. Offices require a level of 30 fc, and power houses, machine shops and like locations, 20 fc. For active outdoor areas 2 fc is recommended; shipping platforms should have 5 fc. Inactive outside areas need only 0.2 fc.

In the discussion of Hyperion's lighting installation which follows, the illumination levels are satisfactory unless noted otherwise.

### Hyperion Lighting

As the Hyperion Treatment Plant is used as an example of lighting for a sewage treatment plant, a brief description of its operation is in order. Hyperion is classified as a high-rate activated sludge plant. Sewage begins the treatment process at the Bar Screen room in the Headworks building, where coarse debris is removed, ground by disintegrators and returned to the sewage stream. The sewage then passes through Detritor basins where sand and other grit are removed. The raw sewage enters the primary settling tanks where suspended solids are removed by plain sedimentation. It next flows to the aeration tanks where activated sludge is intro-

duced, thence to the final settling tanks. The clarified effluent is discharged to the sea. Excess sludge is returned to the primary tanks whence it, along with the primary sludge, is pumped to the digesters. The digested solids are pumped to elutriation tanks for washing, then to the filters and the driers. The dried fertilizer is stored in the Ele-

vator building and in the Storage building until sold by the fertilizer contractor. Digester gas is used both by the drying furnaces and by gas engines. It is interesting to note that Hyperion has its own electric system which generates all the energy used throughout the plant.

### Street Lighting

Luminaires with 400-watt mercury-vapor lamps<sup>1</sup> are hung 28 feet above roadways, spaced from 130 feet on main roads to 190 feet on lesser traveled streets. Illumination is 1 fc directly under lamps and 0.2 fc midway between standards. Lighting has proved to be satisfactory except on foggy nights when curbs are difficult to see. White beaded lines were painted on street centers to assist drivers on such nights. The street lights are turned on and off automatically by an astronomical clock 10 minutes after sunset and 10 minutes before sunrise. The circuits are of the 20-ampere, series type.

**Deck Lighting:** The deck lights are a part of the street lighting system except for the Primary Settling Tank units which are identical in appearance to the other units but are wired in multiple on a separate circuit; 250-watt mercury-vapor luminaires<sup>2</sup> are mounted 14 feet above the deck, spaced at 30-foot intervals. The illumination averages 2 fc along the lighted walkways and



● NIGHT view of several of the eighteen digesters. Low and high pressure gas holders and Service Building are in the rear. Exposure for picture 10 sec., f 5.6.

is adequate for normal operations. The Elutriation deck is not presently lighted; portable lights are used when it is necessary to work on this deck at night.

### Other Outside Lighting

Hyperion is surrounded by an 8-foot fence which is unlighted except at the main gate. The 200-odd street and deck lights illuminate the whole 76 acres of plant area, and no further protective lighting is required. The stack, which is in line with the runway of the Los Angeles International Airport, is brightly illuminated by 16 floodlights<sup>3</sup> each using a 1500-watt tungsten lamp. The Digesters have warning lights<sup>4</sup> on top, and curb-type units<sup>5</sup> on the side for roadway lighting.

**Laboratory and Office:** The laboratory and offices in the plant are furnished with recessed fluorescent fixtures<sup>6</sup>. The illumination averages 30 to 40-foot-candles, except in the drafting room where there is 70 fc of in-service illumination<sup>7</sup>. There is one 80-watt fixture for every 30 to 40 square feet of room area in the offices.

**Headworks:** High-bay fixtures using 500-watt lamps are spaced on 14-foot centers in the 30-foot roof of the Bar Screen room; and low-bay units also using 500-watt lamps are spaced on 18-foot centers in the 17-foot roof of the Detritor room.

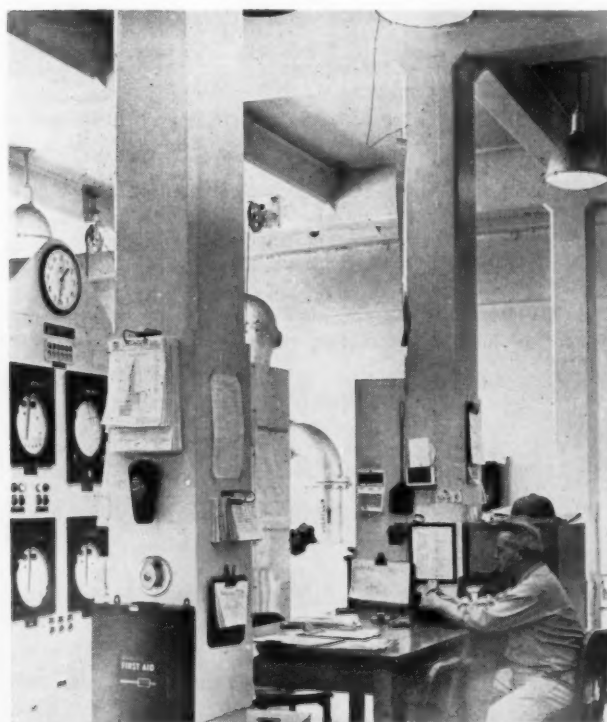


● **WATER** biology room of the Laboratory has recessed overhead fluorescent lighting fixtures which provide 30 to 40 fc. Picture exposure 1 second, f 22, overcast.

These units are all serviced from roof-top. This mounting method was used because, among other reasons, it would be difficult, if not impossible, to reach many of the fixtures from ladders. The Chlorine room has conventional suspended low-bays, using 500-watt lamps on 10-foot centers. Lighting throughout the building has proved to be adequate; illumination is 9 to 13 fc.

### Pump Rooms and Pipe Galleries:

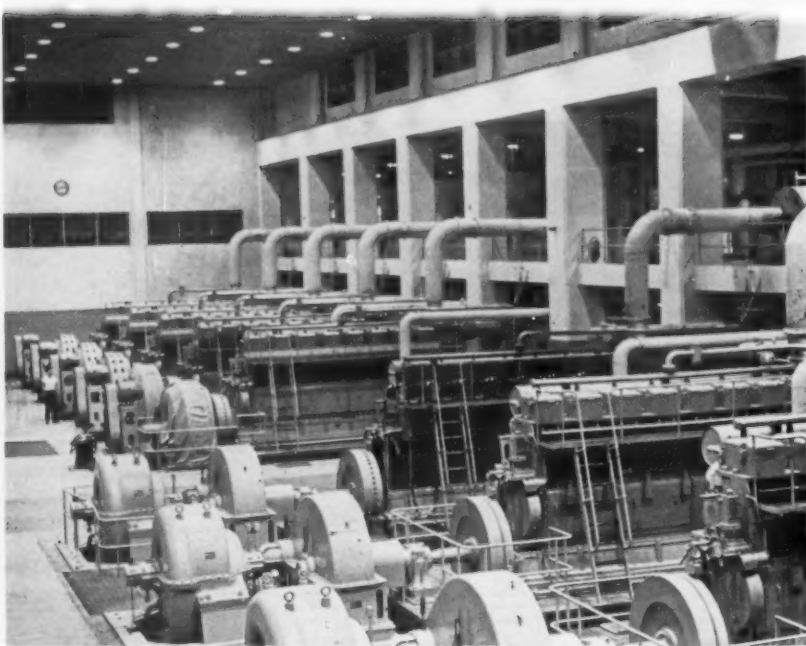
The pump rooms in the plant (Digesters, Primary Settling, Final Settling, Power & Blower, Filter & Drier) are provided with low-bay fixtures on 12 to 16-foot centers using 300 or 500-watt lamps. Lighting averages 6 to 12 fc. Bracket fixtures<sup>8</sup> using 150-watt lamps are mounted at 15-foot intervals on the pipe gallery wall.



● **DAY** VIEW of digester battery control room; low-bay units with 300-watt lamps are spaced 12 ft. Exposure 1/5 sec., f 16.



● **NIGHT** view of the digester battery control room. Lighting was improved by using 500-watt lamps. Exposure 1 sec., f 5.6.



● NIGHT view of engine room; enough power is produced to furnish residential requirements for city of 100,000. Illumination level is 15 fc. (f 5.6, 1 sec.)

**Digesters:** Low-bay units using 300-watt lamps are spaced on 12-foot centers in the Digester control rooms. Office type lighting would have been better here as much paper work is done in these rooms and operators have complained of eye strain. Increasing the lamp size to 500-watts and frosting the lenses of the units over the desks helped some. Excessive contrasts between bright and dark areas is probably the cause of such eye strain, as supplementary desk lighting was tried but did not help. The illumination level is about 10 fc.

**Filter and Drier:** High-bay fixtures using 500-watt lamps are installed in the 40-foot high Filter room ceiling on 11-foot centers; illumination, 16 foot candles. High-bay units using 1000-watt lamps are installed in the Drier room roof on 11-foot centers; illumination, 5 to 10 fc. A large portion of the light is lost by interception and is wasted

on dark or dirty surfaces in this necessarily jumbled room. Low-bay units using 200 or 300-watt lamps are hung on 8 to 12-foot centers in the basement areas and in the Elevator building; lighting level, 5 to 10 fc.

**Fertilizer Storage Building:** This open-sided building holds 6000 tons of dried fertilizer. Unpelletized fertilizer is very fine, and as a result too dusty for some uses. Low-bay units using 500-watt lamps are spaced every 10 feet to illuminate the loading platform to a level of 6 fc. The outside edges of this building are illuminated to a level of 2 fc by using 300-watt lowbays spaced at 12-foot intervals.

**Power & Blower:** 1500-watt high-bay units are spaced on 14-foot centers in the 43-foot ceiling of the Power & Blower building. The level of illumination on the operating floor is 15 fc. Special fixtures<sup>9</sup> with focus in lenses are used for vertical

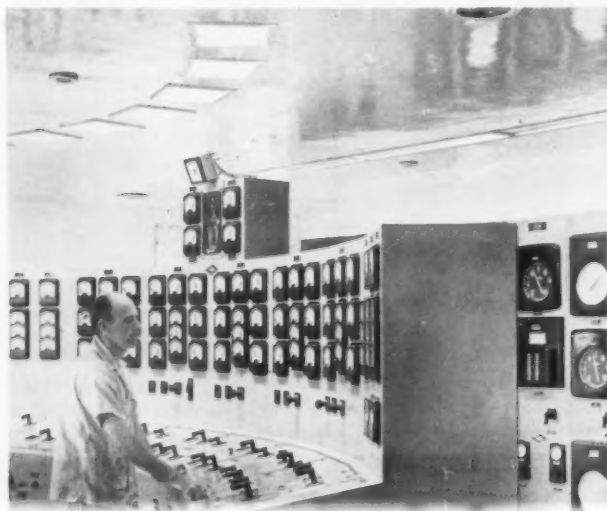
lighting on the switchboard. Each unit concentrates the light from one 150-watt lamp on one 2 by 4 panel. The high intensity light (44 fc) eliminates troublesome reflections from the engine room. The wall mounted meters are illuminated by non-glare fluorescent fixtures<sup>10</sup>. Each lens contains hundreds of aluminum ribbons to shade direct glare from the light which is concentrated by parabolic mirrors. The vertical illumination from these units of 8 fc is barely sufficient for easy reading of the meters.

**Service Building:** In the Service building, 500-watt high-bays are mounted in the 28-foot high roof of the building on 15-foot centers for lighting the Machine Shop, the Storeroom, Pipe Shop and the Welding Shop. Illumination is 6 fc. This is low, particularly for the Machine shop. Larger lamps cannot be installed in the existing fixtures, so supplementary lighting is widely used. The other rooms in the service building use 300 or 500-watt low-bays on 10 to 16-foot centers; lighting level varies from 5 to 15 fc.

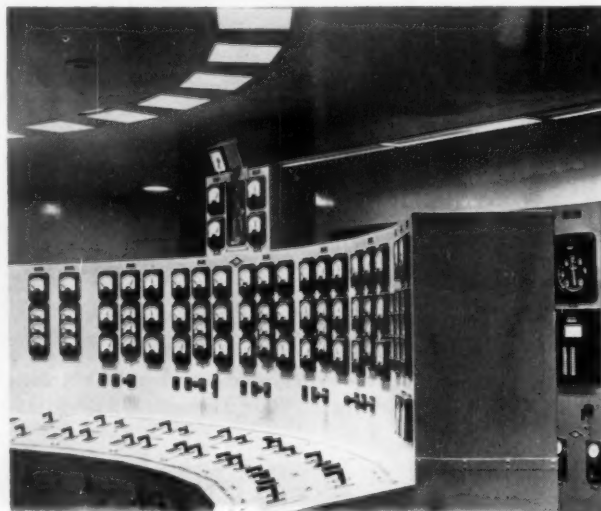
#### Reference to Fixtures

1. G.E. Luminaire, type 101
2. Westinghouse, type OV-20
3. Crouse-Hinds, type 11 20 LCE
4. Crouse-Hinds, type WV-380
5. Crouse-Hinds, type VCD-12
6. Sunbeam Lighting, Recessed
7. Weston "Sightmeter"
8. Benjamin Electric, wall unit
9. Holophane "Controlens"
10. Daybrite-Fluorescent, "Cof-fer"

● SWITCHBOARD room, daytime view. Generation of power for Hyperion's electrical system is controlled from here.



● SWITCHBOARD room, night view. Special fixtures focus light on panels, eliminating reflections. (f 11, 5 seconds)







## Stage Construction of County Roads

THE great increase in the number and speed of motor vehicles; the universal use of trucks for hauling all sorts of materials; and the expansion of rural mail routes and school bus routes have led property owners to demand all-weather, dust-free roads. This is a just request; they should be relieved of the annoyance and inconvenience of dusty, muddy and snow-bound roads.

The big draw-back to construction of all-weather secondary roads, at least in Ohio and particularly in Licking County, is the lack of money to construct the roads and to maintain them adequately after construction. Although the people who live on and use these roads are willing to pay necessary increases in license tax fees and gasoline taxes to finance the construction of these roads, they are outvoted in the State Legislature by the metropolitan areas; and the State Highway Department also demands money for its expressways and major thoroughfares. As a result of this financial impasse, Licking County has had to inaugurate a program of stage construction for these roads.

With the stopping of WPA monies and the lack of manpower, equipment, and materials during World War II, roads became clogged with brush and weeds. The ditches filled in, and even the fences were moved closer to the road pavement by farmers wanting to cultivate as much land as possible. Our first step towards all-weather roads is to clean out and move back the ditches and provide adequate drainage in general. This procedure has been economically speeded up by the acquisition of a Travel-loader.

When the ditches are moved back, a minimum roadway width of 26 feet

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### JAMES T. HOLDEN

County Engineer, Newark, Ohio

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and a metal width of 16 feet is provided. This we consider to be the bare minimum for present day traffic and where possible a width of 20 to 24 ft. is provided for the traveled surface. All small bridges and culverts are widened, extended, or replaced at the same time in order to remove all bottlenecks in the improved road. After establishing the new width of road, aggregate is added where needed to build up the road base preparatory to surface treating. After the ditching has been completed, aggregate added to the road, and the road graded for traffic, salt water is applied at the rate of one-half gallon per square yard, not only for dust control but also to help stabilize the road. Licking County is fortunate in having a source of brine from abandoned oil wells which tests three pounds of chloride per gallon of water. Thus one-half gallon of the brine is equivalent to one and one-half pounds of chloride and can be applied on the road at a total cost of 2.5 cents per gallon, or in terms of chloride, \$16.67 per ton on the road.

The new road bed is allowed to go through at least one winter to make sure all soft spots and other drainage troubles have been rectified before surfacing.

#### Complete Stabilization

As soon as enough funds are available, complete stabilization of a road is accomplished through the use of a pulvi-mixer. The proposed

full pavement width, as a first step, is scarified to a depth of six inches and then worked over with the pulvi-mixer to grade and mix the existing base and spread it uniformly over the road. Then brine is added in dry weather until the optimum moisture content of the road has been reached. This will vary depending on conditions but will average about 7500 gallons of brine per mile of road. After applying the brine, standard operating procedure is: The pulvi-mixer is again passed over the road, thoroughly mixing the brine into the full width and depth of the scarified material. After this the road is rolled with pneumatic tires (empty dump trucks will do the job). The resultant surface is a hard, stabilized, dust-free surface. The complete operation is very inexpensive, costing only about \$300 per mile of road, 6 inches deep, and 20 feet wide. When this is done, the road may be double sealed in the fall without having to wait for the effect of a winter, since complete stabilization of the road has been accomplished and all soft spots have been removed. And since it is so economical it will not financially affect the long range plan of stage construction.

After the road has survived one winter and is still in a good stabilized condition, a double-seal surface treatment is placed on the road. This double-seal consists of a prime applied at the rate of 0.25 gallon per square yard of surface; a base course consisting of 0.50 gallon bituminous material and 50 lbs. of No. 46 aggregate per square yard of surface; and a seal coat of 0.25 gallon bituminous material and 22 lbs. of No. 6 aggregate per square yard.

The double seal is applied in late

spring or early summer and is allowed to go through the following winter without further treatment. Usually the road is given a single seal about 18 months after the original surface course or in the fall prior to its second winter. This provides enough thickness of pavement to withstand freezing and thawing for two to three years.

When the road needs to be resurfaced a heavier treatment is applied consisting of an 80 to 90-lb. type T-32 road mix through a self-propelled pugmill mixing unit. About 0.60 gallon of bituminous material is used in this mix and the finished mix is sealed as before with No. 6 aggregate. This treatment results in adding approximately one inch to the surface giving a total surface depth of about two inches in addition to the stabilized base. It has been found that this surface will last 5 to 7 years with perhaps one

single seal treatment during this period.

After 8 to 10 years from the initial surfacing of the road, it is in condition to receive a more rigid and higher type surface. A course of hot-mixed asphaltic concrete, type T-35 is applied to give a rolled thickness of 1¼ ins. With this application the stage construction of a road is completed. Costwise, stage construction of a road can be broken down into the following average per mile cost. Double seal, \$2400; single seal, \$900; T-32 pavement, \$3500; T-35 pavement, \$5000. The initial cost of repairing, extending or replacing drainage structures, opening up and moving back ditches, and adding aggregate for traffic bound surface, varies considerably from road to road and cannot be averaged as to cost very closely. Disregarding this initial cost, the cost for providing a high type

surface over a period of ten years is \$12,700 per mile of road. This cost, if the work were done in a single year, would be prohibitive; but by using the above described method of stage construction approximately 15 miles of road is brought forward in each stage each year.

This method of stage construction has proved to be very satisfactory in Licking County and has been well accepted by the people who live on and use these secondary roads. They would rather have 15 miles of road brought forward in gradual stages than one or two miles of concrete or other high type pavement each year. More and more people are being given all-weather surfaced roads each year and in a very few years the whole of Licking County's 400 plus miles of county roads will be able to carry adequately our increased and heavier traffic.



● **LOADING** windrowed material with an Adams Traveloader. A motor grader was used for ditch and shoulder cleaning work.



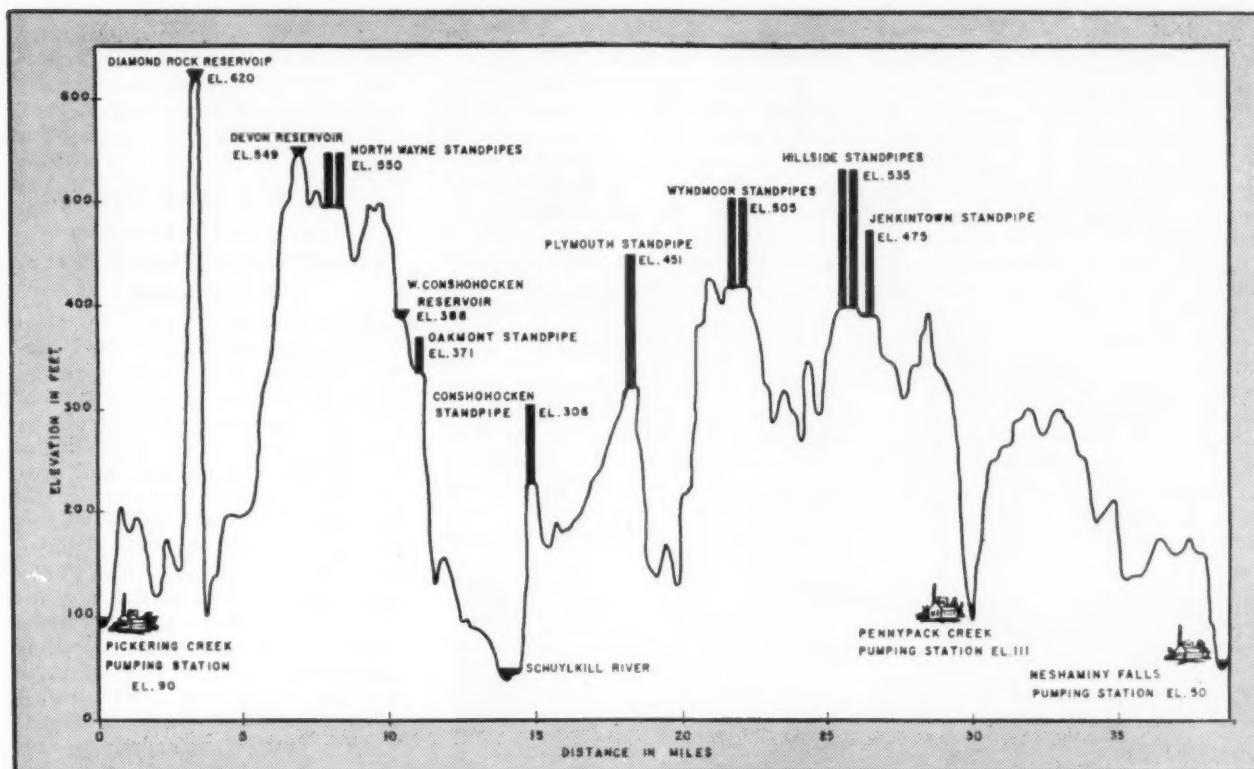
● **SURFACING** was completed in reduced time by using two Barber-Greene finishers working in tandem as shown here.

## MATERIALS USED BY A STATE HIGHWAY DEPARTMENT

We have become accustomed to thinking of highway construction and maintenance in terms of hundreds of thousands of dollars, but when viewed in terms of materials used we do not realize the amount of materials a highway department uses each year. For instance in the fiscal year of 1953-54 the Texas Highway Department used almost 150 tons of the minute glass beads used in reflectorized highway stripes. Has anyone ever calculated how many beads there are in one pound? Or how many tank cars are required to move the some 83 million gallons of asphalt used in the work?

Here is a list of materials used by the construction and maintenance departments of the Texas Highway Dept. in the fiscal year 1953-54:

Item	Construction	Maintenance
Asphalt (all grades)	59,233,829 gals.	23,577,872 gals.
Gravel (unclassified)	.....	372,466 cu. yds.
Cr. Stone (unclassified)	.....	215,623 cu. yds.
Cement (all types)	1,182,009 bbls.	22,047 bbls.
Hot-Mix Asphaltic Conc.	1,458,286 tons	1,950 tons
HMCL Asphaltic Conc.	73,217 tons	166,514 tons
Rock Asphalt, Cover Stone	49,741 tons	37,786 tons
Rock Asphalt, Item 314	197,861 tons	236,608 tons
Rock Asphalt, Item 315	19,083 tons	306 tons
Lumber, Creosote	43,743 B. M.	449,577 B. M.
Lumber, Penta	28,524 B. M.	770,262 B. M.
Piling, Creosote	15,031 l. f.	20,821 l. f.
Pipe, Reinforced Concrete	420,282 l. f.	12,346 l. f.
Pipe, CGM	65,881 l. f.	41,263 l. f.
Reinforcing Steel	27,149 tons	489 tons
Railing (all types)	120,087 l. f.	4,550 l. f.
Steel Plate Guard Fence	124,637 l. f.	22,807 l. f.
Paint (all types)	24,778 gals.	146,810 gals.
Glass Beads	.....	299,970 lbs.
Cutback Asphaltic Concrete	3,667 tons	28,562 tons



## WATER LEVEL TELEMETERING

# in an AUTOMATICALLY CONTROLLED DISTRIBUTION SYSTEM

**GEORGE H. DANN,**

Vice President,  
Philadelphia Suburban Water Co.

**T**HE Philadelphia Suburban Water Company was formed over thirty years ago through the merger of 38 small water companies, each serving the needs of a different community within an area of roughly 300 square miles. The total number of customer accounts was only 45,400 for the entire area, and this low density population made a very sprawling distribution system necessary. This sprawling system is still necessary today. However, because of the relatively low volume of water consumed by the population, distribution was then a relatively simple matter. The water company engineers merely located the highest elevations in the system, and constructed storage facilities at

these points. Pumping stations filled these facilities, and gravity pressure was sufficient for distribution.

As the population increased, with the expanding industrial growth in Philadelphia and the Delaware Valley, the problems of distribution grew with it. The varied, hilly countryside, which makes suburban Philadelphia so attractive to home-seekers, also makes for problems in water distribution. The elevations within the area range from sea level to 600 feet above, and often include variations of 100 feet within a standard city block, or an eighth of a mile. These sharp variations naturally add greatly to the problems. The fact that Philadelphia Suburban does not have the usual one main source of water, but rather four such sources, also increases the complexity of the system.

Because of the nature of our problems, we have had to install more booster pumps and pressure regulating valves per mile of pipeline than is usual with most other water utilities. For our 1,668 miles of dis-

tribution pipeline, we have installed 25 booster stations, 74 booster pumps, and 88 pressure-regulating valves. These booster pumps are automatically-controlled, with a definite starting and stopping sequence to meet the particular demand requirements of the individual pressure zone. These pressure zones are "enclosed" by check valves situated around the perimeter of a zone, and a pressure of 50 psi is maintained by a small booster unit. Normally the zones which require "boosting" are near main transmission lines or storage facilities. During periods of peak demands when the booster pumps cannot handle the load, as during a bad fire, the check valves open into the zone and the various feed points supply a large enough volume of water to meet the needs within that zone.

Scattered throughout the system are six storage reservoirs and twenty standpipes. These storage facilities are supplied by means of double-acting altitude valves which close when the reservoirs are full,



and open when the demand is greater than the pumping rate. The level of the various reservoirs and standpipes is under constant supervision by office personnel at the headquarters of the company through the use of a battery of Bristol Metameter water level telemeters. These telemeters bring readings of the levels in sixteen reservoirs and standpipes into the office, where they are recorded. With these constant records of actual conditions in the prime storage areas, the man on duty in the radio room (where the Metameter recorders are located) has a constant watch on the pulse of the discharge system. If some abnormal change in that pulse occurs, because of a fire, main break, accident-damaged hydrant, or any other abnormal de-

men in the area to investigate, so that a minimum of damage and inconvenience results.

The four sources of supply are spaced around the perimeter of the distribution area. These sources, with the pumping capacities of each, are: Crum Creek, 49 mgd; Pickering Creek, 35 mgd; Neshaminy Falls, 25 mgd; and Beth Ayres, 5 mgd. The type of pumping equipment varies from the cross-compound-type steam pump to steam turbine-driven pumps and motor-driven centrifugal pumps. The pumping units delivering from these four sources into the distribution system are synchronized, so that they pump into an open system, so to speak. Any reduction of pressure on one source allows water from another source to move further into

eter telemeters, and the constant radio contact with service units and maintenance crews in the field, provide the perfect solution to the problem of such mechanical failures, and consequent disruption of water service.

### Time and Labor-Saving Possibilities in State Highway Departments

A questionnaire sent to state highway departments, by the Highway Research Board of the National Research Council, to discover what progress has already been made in adapting time and labor-saving possibilities into methods and procedures obtained the following interesting facts: (1) aerial photography is used by 46 planning bureaus, 44 locating bureaus, 28 design bureaus, 20 material bureaus and 17 soils bureaus; (2) high-speed computing is used in 35 planning bureaus, 29 traffic bureaus, and 40 cost accounting bureaus; (3) other disciplines, such as report writers, economists, appraisers, etc., are used in 9 administrative bureaus, 25 planning bureaus, and 45 right-of-way bureaus, and (4) tabular data developed to replace computing is used in 25 design bureaus, 33 bridge bureaus, 17 estimating bureaus and 17 traffic bureaus.

Of special significance, 39 highway departments have modified their organization structure, 34 have realigned functions, 27 have modified their liaison with other bureaus and 26 have used special reproduction equipment.

### Downtown Merchants Purchase A New Street Lighting System

One of the oldest shopping districts in New York, 14th Street, will shortly have the most modern street lighting system in the country, completely financed by the members of the 14th St. merchants' association. The new street lighting system will provide modern fluorescent lighting, with four times the illumination of the present city street lights; also, this will be the first time fluorescent lights are used for an entire New York City street. Each of the new lighting standards, of polished aluminum, 27 feet high, will contain four 8-foot fluorescent tubes. The new lights will be spaced 70 feet apart, in place of present lamp posts, which are 140 feet apart. The Broadway Maintenance Corp. will install and maintain the new lights.



● RADIO room; instruments behind the operator are the Metameter telemeter receivers which show a continuous record of the water levels at the various reservoirs.

mand, he can take steps to compensate for the change within moments after it occurs.

The radio room maintains contact with automobiles and trucks assigned to the operating and construction departments, through the use of Station PSWC, company-owned radio transmission and receiving system. The control station, located in the home office in Bryn Mawr, maintains a 250-watt transmitter and suitable receiving equipment. The radio man is in a position to correlate the activities of the various crews, and direct the work of each. Also, in case of any abnormal situation which becomes apparent on the Metameter recorders around him, he can immediately dispatch

its mobile territory. The double-acting altitude valves at each reservoir remain open until the reservoir is full, and then close until the demand rate exceeds the pumping rate again.

The Philadelphia Suburban Water Company now supplies water to over 145,000 customer accounts, with an average daily demand of 40.45 mg in 1954. Peak day in 1954 was 56.63 mg.

With the large number of automatic controls acting individually and independently to maintain satisfactory water service, there is always the chance of mechanical failure. We feel that the continual surveillance of the critical points in the system afforded by the Metam-

# HOW HARTFORD GETS READY for SNOW and ICE

CHARLES W. COOKE,

Director of Public Works

Hartford, Conn.



**P**REPARATIONS for winter operations are started in late summer or early fall. The entire snow removal and ice control program is reviewed. This includes a re-study of the salting and sanding routes, the plowing routes and the loading routes. The development of new streets, the growth of business enterprises here and there and variations in traffic pattern usually point up spots in these three plans which should be changed.

All snow fighting equipment is gone over—loaders, blowers, plows, material spreaders, etc. Arrangements are made to hire private trucks for plowing when needed. A list is prepared of trucks which can be rented on short notice for carting snow. Of course, included in these pre-winter plans is our personnel organization—supervisors, foremen and inspectors, timekeepers and others.

The stock of about 600 sand boxes is checked over. These are placed at various street corners and other strategic points and kept filled throughout the winter with a mixture of sand and salt (about 3 part sand to 1 of salt). The public is invited to make use of this material as a safety measure whether on public walks or on approach walks to private buildings. Department forces use it on crosswalks.

Hartford has 560 streets, in total length about 220 miles; 90 miles of this represents streets in residential areas. The balance of 130 miles includes the business center, the main traffic arteries and the traffic feeders. The hills amount to about 25 miles.

## Is the Climate Changing?

Table No. 1, taken from the U. S. Weather Bureau records, shows the snow fall in inches in Hartford by months since 1940.

Table 1—Snowfall in Hartford Since 1940.

Season	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
1940-41	5.0	4.1	10.3	1.9	18.7	0	40.0
1941-42	T	1.0	7.1	5.7	2.3	0.5	16.6
1942-43	T	10.2	19.6	8.5	9.6	0.1	48.0
1943-44	4.6	0.4	0.7	8.9	12.2	T	26.8
1944-45	6.6	12.9	20.1	24.3	2.9	0	66.8
1945-46	10.0	45.3	10.2	13.5	0	0.9	79.9
1946-47	0.2	5.1	6.4	18.7	2.9	0.7	34.0
1947-48	0.4	22.9	27.6	15.0	11.8	T	77.7
1948-49	1.7	13.2	16.4	13.4	15.8	0	60.5
1949-50	3.9	12.6	3.6	18.9	5.6	4.7	49.3
1950-51	T	7.4	12.3	6.1	11.3	0	37.1
1951-52	0.6	9.7	16.3	16.1	4.2	0	46.9
1952-53	0.3	2.2	16.4	6.5	T	T	25.4
1953-54	4.3	0.1	17.1	1.1	T	0.3	22.9
1954-55	0	2.0	1.1	3.8	6.3	0	13.2

The average annual snow fall since 1905 is 39.1 inches.

The table shows a steady decline in snow fall for the past four years. On the other hand, the average fall in ten year periods since 1905 does not indicate a decline, as shown in Table 2.

Table 2—10-Year Snowfalls

Period	Average Annual Fall
1905 - 1915	37.5 Inches
1916 - 1925	39.7 "
1926 - 1935	35.6 "
1936 - 1945	37.8 "
1946 - 1955	44.7 "

It has been suggested that our climate is changing; that less snow fall can be expected. Table 2, however, shows greater fall in the last ten-year period than any previous ten-year period. Also, it is interesting to note that a similar four-year decline in snow fall occurred 40 years ago, 1909 to 1913, when the snowfall dropped from 46.6 ins. to 35.8, 30.9 and 19.7 ins. in successive years.

It seems wise to continue to prepare for snow and ice conditions comparable to what have been experienced in the past. If our climate is changing, the only change reflected in snow fall records is the apparently normal fluctuation. Nor is there any definite indication of climatic change in the mean annual temperature records. While the last



● **SNOW**, especially if it comes during rush hours of traffic, can cause much trouble. Early forecasting service and good organization permit a prompt start.

three 5-year averages are 49.3, 50.4 and 51.1 ins. respectively, practically the same averages are found in the period 1920 to 1935.

### Weather Forecasting

Close contact is maintained with the local Weather Bureau Office. Each morning, the weather report is received by phone, and also more frequently when a snow or ice storm is approaching. Within the past year, the Weather Bureau suddenly moved its office to Bradley Field in Windsor Locks, about 15 miles away. (This office had been in Hartford since 1905). Such a move was, of course, unfortunate. The Travelers Insurance Company has equipped and staffed a complete weather service department in the center of the city and has made these facilities available to the Department of Public Works.

For several years, the forecasts of the Northeast Weather Service of Lexington, Massachusetts have been used. This is a private forecasting agency. Not being burdened with considerable routine weather reporting, they can pin-point a definite locality in preparing their forecasts, and furnish a true warning service. Their fees have been more than saved in reduced overtime payrolls and the use of equipment and ma-

terial. Weather data are also secured from the New Haven Weather stations and also from the Connecticut State Highway Department.

**Catch Basins Marked:** The street maintenance forces locate all catch basins so they can be found after snow storms. They are marked by a short stripe of yellow traffic paint on the sidewalk behind the basin. Where there is no walk, the yellow stripe is placed on the pavement in front of the basin.

**Rush Hour Ice Control:** With traffic volumes increasing each year, more attention must be paid to controlling icy pavements, particularly during morning and afternoon rush hours. This situation is watched very closely and if there appears a good chance that icy conditions will prevail during these rush hours, the main arteries, particularly the hills, are treated with a salt-sand mixture in mid-afternoon or very early in the morning before the particular rush hour starts. This usually results in about two false moves per winter, but with no icy street tie-ups during rush hours.

**Salt Spreading:** When a snow storm has accumulated to about one inch depth, rock salt is spread on the 155 miles of streets noted above (business streets and hills). This spreading follows a very carefully

prepared schedule of routes. The hills, of course, receive attention first.

When treated in this manner with salt, the snow either begins to melt or remains soft and mealy and does not adhere to the pavement unless the temperature is unusually low. This spreading of salt is carried on with the normal traffic flow and the action of traffic, of course, mixes the salt with the snow and is very helpful in keeping the snow in a soft state.

Except for three or four trucks supplied by the local bus company, only department trucks are used for spreading salt or sand-salt mix. This equipment includes three 8-ton Highway spreaders and thirteen Burch spreaders. The bus company's trucks are equipped with Good Roads spreaders. Salt spreading costs average about \$37 per mile of street per storm including salt, trucks at rental rates and payroll.

**Emergency Declared:** When a sufficient depth of snow has accumulated (4 to 5 inches) or it is certain to occur within a few hours, the Chief of Police is requested to declare a state of emergency and, by use of the press, radio and television, ban all street parking of vehicles throughout the city, and continue the ban for a day or two as may be necessary. The towing away of illegally parked cars is handled by the Police Department using private contractors.

Morning traffic hampers plowing operations, and the period between midnight and 7 a.m. is the best time to plow but, unfortunately, storm schedules are not based on human desires.

**Where to Start:** Whether to plow the residential 90 miles first or the 130-mile business area depends upon the time of day the storm starts. As a general policy, it is preferable to plow the business streets first, but occasionally the procedure is reversed, the residential streets plowed during the evening and the business sections after midnight. When once started, plowing operations are continuous and can be completed on the entire 220 miles of streets in from 12 to 18 hours, depending on the depth of snow.

Occasionally it has been possible during a long storm with the aid of the Police and radio to clear parked cars out of the business area and plow in the afternoon. When plowing of the residential areas has been completed by midnight, it is necessary to replot the central area to prepare for the morning rush hour along traffic arteries and furnish





● **TYPICAL** snowstorm condition. To keep the streets open, 62 snow plows are used. In average winter, streets are plowed six times at a cost of \$20.80 per mile.

usable streets for stores and other business houses.

### Plowing Operations

Plowing is done by 62 plows; seventeen of our highway trucks are used; we place 22 city-owned plows on hired trucks; and we rent 19 trucks equipped with the truck owners' plows; four trucks with plows are furnished by the bus company. We pay \$7.50 per hour for truck and driver whether the truck is equipped with our plow or the truckers'. One-half hour time at the plowing rate is allowed for attaching and detaching plows whether the plow is city or privately owned. During the winter of 1951-52, the streets were plowed six times at an average cost of \$20.80 per mile. This includes equipment rental, overtime pay for drivers, shop crew and checkers.

The plowing operations are carried out on 21 pre-arranged plowing routes. Each route starts with a main artery and then spreads to secondary streets and finally to the residential sections. Hence, if it seems desirable to plow the business areas first, we start the plows at the top of these routes. Starting at the bottom of these routes clears the residential areas first. After the plows are dispatched, their progress is watched by "checkers" in pick-up trucks or cars. These checkers watch for soldiering and also report unbalanced progress, in

which case a route in difficulty is helped by transferring a plow or two. When plows complete a route, they are sent to some point on an unfinished route to work the route backwards until the plows working that route are met.

**Plowing Costs:** The winter of 1951, an average winter, required plowing these routes six times at an average cost of \$20.80 per mile or \$3.73 per mile per inch of depth. These costs should be increased about 10 percent to agree with present rates of pay and truck rental.

**Two-Way Radio:** Since last winter, a mobile telephone system has been installed in 12 department ve-

hicles with remote control units at both the yard and office. This should be extremely useful in controlling all phases of winter snow and ice control operations. It is hoped that next year's budget will permit equipping six more vehicles with radio-phones.

**Sanitation:** During snow plowing and removal operations, the refuse collection personnel and equipment are kept at their regular work unless the snow fall becomes deep enough to prevent the barrel rollers from pushing their hand trucks through the snow. When this occurs and until the property owners have shoveled the necessary paths for the barrel rollers, these refuse collection crews, with their foremen, are assigned the task of clearing crosswalks by hand shoveling. The collection of refuse is a continuing necessity, operating 5½ days a week and any interruption results in complaints and expensive overtime. Except when absolutely necessary, this important sanitary function is not interfered with. Only rarely has weekly collection throughout the city been incomplete. Refuse trucks are not used for plowing snow, sanding operations or snow cartage.

**Borrowed Personnel:** During winter storms, personnel is borrowed as needed from other city departments. Snow loader operators come from the Park Department and inspectors from the Engineering Department. The Health Department will also furnish personnel as needed. Exclusive of refuse collection forces, about 250 are available. A twelve-hour shift schedule is used,



● **LOADING** and disposal of snow is big business, with 90,000 cu. yds. in the average winter. Here is working a Snogo loader on a White truck.

when possible, to get the maximum equipment use and to avoid burning up personnel by excessive work stretches.

### Snow Loading

Loading operations usually start between 8 and 9 a.m. to allow property owners in the business area an opportunity to clear their sidewalks. Not all walks are cleared when the loaders arrive and it is necessary to do some back tracking but by waiting until 8 or 9 in the morning, considerable sidewalk snow is picked up on the first loader trip.

Loading work is carried out along 9 established routes, a total of about 60 street miles. These loader routes are so planned that each loader starts at an important spot in the center of the city and when the central area has been cleared, the several principal traffic arteries are cleared from curb to curb, practically to the city line. Each of these loader crews consists of an operator, a foreman and a police officer. The rates paid for rented trucks and drivers hauling snow are based on size of truck and range from \$4 per hour for a 3-yd. water level body built up to 8 (but less than 10) yds., to \$8 for a truck of over 18 yds. capacity.

The snow loading equipment is the same in amount as in use ten years ago. In the meantime, traffic volumes have at least doubled and it is believed that more snow removal equipment should be provided so that these principal arteries can be cleared without waiting until snow has been removed from the entire business center.

**Loading Costs:** The cost of disposing of snow by loading and carting away varies from storm to storm depending on the depth and character of the snow. During the winter season of 1951-52 (a typical winter), 90,000 cu. yds. of snow were disposed of at an average cost of 56¢ per cu. yd. This cost varied between 29¢ for freshly fallen light snow to a maximum of 95¢ for snow which had turned to ice and was frozen to the pavement. These unit costs include the department's equipment at current rental rates and payrolls with direct supervision.

There are a number of streets with no sidewalks on one side, particularly along public parks. The plowed snow is blown from these streets into the parks instead of loading and carting it away.

One snow blower loaded 39 12-yard truck loads in 50 minutes with ½ mile haul to the snow dump.



● TYPICAL winter in Hartford has 27 snowfalls with 44.9 ins. of snow. Cost of sanding, salting, plowing, loading and carting runs \$5,000 to \$6,000 per inch fall.

From 5 to 10 trucks per loader are used depending on length of haul. At the present time, three snow dumps are in use. At these dumps, dozers are used to clear unloading areas.

### Comparative Costs

The experience of the past five years indicate that the cost of salting and sanding, plowing, loading and carting away snow varies from \$5,000 to \$6,000 per inch of snow fall per storm. Also that about 20 percent of this cost is represented by salting and sanding, about 12 percent in plowing and the balance of 68 percent in loading and carting away. It is obvious that every cubic yard of snow which can be melted by use of salt saves the 80 percent items of plowing and carting away.

**Typical Winter:** The monthly reports of the U. S. Weather Bureau, shows 27 snow falls, with a total depth of 44.9 ins. in the 1951-52 season. A number of the small snow falls produced icy pavements. Minimum temperature was 7°; during 12 storms the temperature was under 25°. The first storm occurred Nov 3, the last Mar. 19.

### Other Problems

In the midst of the operations on our city streets, the municipal airport, Brainard Field, must be cleared. A large snow blower and truck plow are kept at the field. This plow clears the parking lot, driveways and does some trimming. The plowing of runways is done by the same plows used on street work. As soon as they can be released, five or six plows are sent to the airport and plow snow to the sides of the runways. These snow ridges are dissipated by the blower. Wind direction is an important factor and plowing methods are varied accordingly. If cross winds are strong, plowing is done with the wind, a quarter of the runway width at a time and this windrow dissipated

by the blower. The same ice problems arise on the runways as on city streets and are handled in the same manner except that salt is used very sparingly and very seldom on the runways. Negotiations are now under way for the conversion of this airport (the first municipal airport in the United States) to industrial development and it may be that after this coming winter, the Public Works Department will no longer have airport snow problems to cope with.

**Special Problems:** Any program such as snow and ice control, which concerns such a large number of persons, depends for its success largely upon proper public relations. Throughout our operations, the public is kept informed through the press, radio and television of what is being done and what the next step will be. During severe storms, the public is advised through these media to stay at home unless it is absolutely necessary to leave. It is believed that these appeals are helpful.

The streets at churches, synagogues and funeral homes are kept clear of snow, and also where funeral services are held at home. These special jobs are taken care of by using graders, front-end loaders and smaller street maintenance trucks. The heavy duty trucking of snow as far as possible is done by rented trucks. They can be replaced without the customary city budget problems.

Of course, there are occasions when the department is accused of waiting until some owner has shoveled his driveway by hand and then re-plowing the street and filling his driveway with snow. However, the average citizen is a reasonable person. The great majority of folk appreciate the department's problems and cooperate to a large extent.

These winter operations are carried on under the direct supervision of Lyman C. Lovell, Deputy Director of Public Works.

# BRINGING A City Lighting SYSTEM UP TO DATE

GUY BROWNING ARTHUR



FOR planning public works Wheeling, West Virginia, may be the most difficult city in the country. The plot of the city was not previously conceived by anyone; it just grew. A map doesn't show the fantastic assortment of steep hills and sharply pitched valleys on which the city was settled along the Ohio River. It doesn't explain the disgracefully staggering course of Wheeling Creek. No one can appreciate this terrain except by walking over it, and only then will he be reconciled to the layout of streets and highways.

If accomplished planners were to lay the city out on this site today they couldn't do better than follow the present plan. They would run the main streets parallel with the river, and the cross streets would run up the hills. Expansion would be chiefly along Wheeling Creek, in spite of its loops and twists. Other sections would be laid out on level areas at the mouths of valleys. And some parts would be connected to others only by a single thread of highway, just as they are now.

For street lighting such a plan shows off at its worst because the lighting has to follow the streets, however they may turn, even if they are only strands of communication between populous areas.

"Old Wheeling," the city as it used to be, didn't have its problems stretched out so thinly. But when it began to annex suburban spots, and became Greater Wheeling, the scope of service broadened. The cost of service per capita must be higher in such a cob-web layout than in a compact checkerboard

plan. Old Wheeling had a municipal lighting plant and street lighting system—beacon type lighting, with incandescent lamps which were hung from wooden poles at the street intersections.

All of the surrounding areas were lighted by Wheeling Electric Company, which is part of the American Gas and Electric System. It has an excellent organization headed up by Robert R. Jewell, vice-president and general manager. When the situation became serious, and the need for improvement of Wheeling's lighting was apparent to everyone, the city requested Wheeling Electric to submit a plan for improving and modernizing.

## Starting Modernization

So in May, 1952, the Electric Company submitted a plan which was accepted. The contract is for 10 years. Modernization is to be completed in 3 years. The first stage of the work was finished in the fall of 1954, and the second and third years will bring the program to an end. The work is being done by R. H. Bouligny, Inc., of Wytheville, Virginia. The Electric Company thought the job might cost \$212,000, but set \$250,000 aside for the job. As of September, 1954, about \$175,000 had been spent.

Applying the standards of the Illuminating Engineering Society, the light intensity on the pavement is determined on the basis of vehicular and pedestrian traffic, and the nature of the abutting structures. But this was not as easy as it is in conventionally plotted cities. The necessity for continuing a high in-

tensity on through streets and highways in stretches where the population concentration is low added some difficulty.

The heavily traveled National Pike, now US 40, comes across the Ohio River into the heart of the city and then takes a devious course through a chain of residential areas to the farthest border. State Route #2 runs along the river, and brings a considerable volume of traffic right through the main streets. Both of these routes must have adequate lighting throughout their lengths, no matter how sparse the bordering population may be.

As part of its proposal Wheeling Electric submitted a map showing by colors the lighting intensity required in different sections in lumens per square foot of pavement. The intensities provided for the downtown area are graduated in the usual way; but this graduation is not continuous along the highways. In business sections of the formerly independent towns the intensity is higher, in line with higher concentrations of population and business.

## The "Escape Route"

One peculiarity is the lighting of an "escape route" which is on high ground above the low lying sections of the Old National Pike. This is necessary because Wheeling is subject to severe flooding. In 1936 the water reached a record high of 55 ft., submerging all of Wheeling Island and coming up almost to Main Street in the business section. In such a flood Wheeling Creek rises so high as to compel evacuation of all houses for long stretches. While this



"escape route" is given only the lowest light intensity, 0.2 to 0.4 lumens per sq. ft. of pavement, it makes the route safe for emergency use.

In its contract with the city, Wheeling Electric seized upon every chance to make the transition as inexpensive as possible. Thus while steel poles are now installed throughout the downtown section, wood poles are being used elsewhere. Also, 920 of the existing fixtures will be rebuilt and continued in service, and 1420 new fixtures will be installed, making the total of 2340.

All the luminaires will be the Type III pattern, enclosed, mounted 25 ft. above the pavement. These luminaires are so designed that all the parts are interchangeable, and can be furnished by any of the three companies which supplied the first units, Line Material, Westinghouse and General Electric. Because of the moist atmosphere, carrying corrosive industrial elements, all luminaires and brackets are aluminum. The brackets are supplied by Line Material Company and Hubbard & Company.

The poles are staggered, with an average spacing of 100 ft., but this spacing is varied in outlying areas and becomes an even 200 ft. on straight stretches.

Wheeling is one of the cities that prize their trees, and most of the residence streets are beautifully shaded and over-hung by elms and maples. To light the streets where luminaires on pole brackets would

only make the shadows denser on the pavement, some change had to be made. Wire cables were stretched across the streets at frequent intervals between poles, 25 ft. above the pavement. The feeder wire is then carried along the center of the street on these cables, and the luminaires are hung from the intersections of the feeder wire and cables. Some of the curb areas may be dark, but the middle of the street is well lighted.

### Financing and Costs

The agreement between Wheeling Electric and the city is remarkable for its cooperative provisions. No doubt it had to be cleared through legal departments, but it is essentially a memorandum offering services which were accepted.

By its provisions the Electric Company paid the city \$49,950 for the old municipal plant. It proposed to modernize the street lighting for approximately \$212,000, but the final price will have to be figured when the old fixtures have been rebuilt and all other adjustments have been made. Wheeling Electric set aside more than this amount of money to do the job, but it may not be needed. At completion, the cost to the city will be about \$73,128 per year, or approximately \$1.25 per capita. This pays for the 2340 lamps on brackets.

There was an interim between the time when the contract was signed and the completion of any modernizing. During this period the cost

to the city was estimated at \$49,000 per year.

Three schedules of annual rates were made to cover three conditions. The first two rates are to be charged when the system has been changed over completely. Table 1 applies to the majority of the lights, that is, the new lights to be installed:

**Table 1—New Light Charges**

<i>New Incandescent Fixtures</i>		
<i>Lumens</i>		
1,000	Wood Poles	\$19.80
2,500	" "	28.20
4,000	" "	39.60
6,000	" "	44.40
6,000	Metal Poles	52.80
10,000	" "	60.00

The second schedule applies to some of the existing fixtures, particularly those installed in recent years on the system of the Wheeling Electric Company, outside Old Wheeling, which can be used in the new system. These rates are lower than those for new fixtures, as shown in Table 2.

**Table 2—Existing Fixture Rates**

<i>Existing Incandescent Fixtures</i>	
<i>Lumens</i>	<i>Continued in Service</i>
1,000	\$16.80
2,500	21.00
4,000	27.60
6,000	33.60
10,000	60.00

Another set of rates, the third, covers the period before the Elec-



● **BEFORE:** Lighting standards 150 ft. apart, opposite, with 4,000-lumen lamps, giving inadequate illumination.



● **AFTER:** Standards 136 ft. apart, have 6-ft. extension brackets and 10,000-lumen lights, giving 0.815 lumen-sq. ft.

tric Company can buy and install the new fixtures; a period in which the old converted arc fixtures continue in service. The rates in Table 3 apply to these converted arc fixtures while they continue in use:

Lumens	Old Arc Fixtures
1,000	\$12.00
2,500	16.80
4,000	21.60
6,000	27.60

For a growing city of 60,000 population this promises to be a very satisfactory system. The operation will be by a company of broad experience, backed up by American Gas and Electric Company's expanding chain of power plants from Michigan into the southern Atlantic states. The enlightened self-interest attitude of power companies is well demonstrated by the service of Wheeling Electric Company in its area. It gives a maximum of help of various kinds to any community with power or lighting problems.

Robert R. Jewell, the active ex-

ecutive, is a close student of the possibilities of expanding power distribution. He cites that the average person in this country now has at his call 2500 kilowatt-hours of energy per year, which we use to eliminate manual labor and to elevate the economic status of our people.

In countries at the other end of the scale human beings are still energy-producers, with an average output for a 12-hour day of less than one kilowatt-hour. Mr. Jewell thinks all hope of improvement lies in making men energy-users, lifting them out of the level of energy-producers. He sees the Wheeling street lighting installation as a step in the demonstration of his conviction.

Certainly it is an advance to change a city like Wheeling from a dark place after nightfall into one in which crime and accidents are steadily reduced in number, and where citizens can walk or drive in safety.

But the benefits are not all in diminished crime and accident rates. They appear also in better business

and more business. People are attracted to well lighted business streets. Customers in the surrounding rural areas find it a pleasure to drive and shop at night. It makes problems for the city to have more people on the streets, and traffic always thickens where the lights are better. In line with steady progress this compels better lighting on other streets.

But better lighting attracts new business to a city. Wheeling has already had concrete proof of this. An official of the Loft Candy Company drove up Main Street after the downtown lighting was finished, and was so impressed with the "new look" of the city that he immediately rented good corner space across from one of the best hotels, and now has a candy store in operation. In about the same way the J. C. Penney Company appraised the newly lighted streets, and decided that Wheeling would be a good place for a branch store. It now has one of the best looking establishments in the city.

## WAYS TO REDUCE TRAFFIC CONGESTION

MARBLE J. HENSLEY,

Traffic Engineer,  
Chattanooga, Tenn.

TRAFFIC and its traveling companion, congestion, comprise one of today's most pressing problems. It is true that we must have large volumes of traffic to keep our cities economically healthy. However, with this ever increasing volume comes the monster, congestion. It is an over-abundance of congestion that plays havoc with people's nervous systems. This traffic problem is not confined to our large cities. Some of our small communities of one or two thousand people have just as serious a traffic problem as our metropolitan areas. Regardless of the size of the community, congestion can be present—and critical.

This problem must be attacked now. We must give relief to our congested street system without waiting for expressways, freeways, or turnpikes. It is true that all large cities must have limited access roads. These high capacity roads must serve the central business area as well as provide by-pass routes. Limited access roadways can not be built at the expense of our existing



● TRAFFIC Engineer is shown here adjusting the timing on a volume density controller which can handle approximately 50,000 vehicles per day efficiently.

street systems; neither can we afford to wait for construction of new roads that are now planned. Congestion is not a future problem—it is a problem which we must attack now. Therefore, it is essential that we operate our existing street system at maximum capacity.

Our existing streets can be made more efficient. We are still operating

many of our street systems at a fraction of their capacity. In order to obtain greater efficiency, every city must have a well balanced traffic program. This traffic program should be based upon Education, Engineering and Enforcement. Even communities of three thousand population need the services of a traffic engineer. With our tremen-

dous investment of billions of dollars in streets and highways, we must keep them at their maximum efficiency.

As in Chattanooga, the Traffic Engineering Department should be a separate and independent one. We, as with a majority of traffic engineering departments, are directly responsible to the Mayor. This department in every city should make recommendations to the governing officials on all traffic matters. Because of the controversial nature of many traffic problems, a non-political committee is needed to make recommendations to the elected officials; also this committee can gain a great amount of public support for the Traffic Program.

### Attacking Traffic Ills

A few of the large number of corrections that can stimulate the flow of traffic on existing streets are:

**Paint Lane & Center Lines.** By the simple process of painting, capacity can at times be doubled. By painting lane and center lines we not only increase capacity but we make the streets more attractive while guiding the pedestrian and motorist.

**Use Uniform Traffic Control Signs.** By using uniform signs we can speed traffic, establish good public relations and make it easier for the motorist to follow directions. Signs must provide good reflectivity during night usage. We have made great progress in signing during the past two or three years. Examples are the use of the red Stop sign and Yield sign. This progress must be continued as we design and construct wider, higher-speed highways.

**Remove Parking.** On a street of average width the removal of parking will double its capacity.

**Develop One-Way Streets.** Making a street one-way will increase its capacity about 30 percent. One-way operation also makes it easier to provide progressive signal timing.

**Install Modern Traffic Signal Equipment.** By using modern signal equipment which responds to the fluctuation of traffic, congestion and delay can be greatly reduced. The latest development in signal equipment will increase these improvements. One company has developed a master controller that will perform 18 functions on two wires. With FCC approval this master can be operated without any interconnecting cable over a radio wave length. Another company has a master that counts the volume of traffic by means of sampling detectors. Based upon this sample, it records the instantaneous density of traffic and selects the cycle length, offsets and percent of green for all its secondary controllers.

**Restrict Loading and Unloading.** On major traffic arteries all commercial vehicles should be prohibited from loading or unloading during peak traffic hours.

**Development and Control of Off-Street Parking.** A proper balance must exist between capacity and demand, capacity and reservoir space and capacity-facility vs capacity-of-street.

**Channelization.** By proper design of guiding islands, traffic can be merged or channeled in such a manner as to reduce the number of conflicting movements and their severity. This type of adjustment will decrease the need of signalization. Other types of intersection, such as the flared, need channelization to reduce the motorist's confusion. In practice, some of these methods can give up to 100 percent increase in street capacity but they

are dependent upon an adequate budget, competent engineering, and public support for their success.

Even with these improvements to our existing street systems, within a very few years these streets will be overloaded. With the rapidly increasing volume of vehicles we must plan now for tomorrow's needs. It is essential that all cities develop a master plan. This plan should be based on transportation, commercial, industrial and residential needs, and should include:

(a) An adequate balance between controlled access, arterial and circumferential streets; (b) protection to residential areas; (c) allowance for future expansion of commercial and industrial areas; (d) providing set-back lines so that proper right-of-way could be obtained on major routes; (e) development of proper off-street parking; (f) providing adequate escape routes for Civil Defense; (g) promote an increased transit usage; (h) protect unpurchased right-of-ways. That is, when the alignment has been established on the ground, no improvements can be made on this property. This allows cities to purchase right-of-ways at a great saving to the tax payer.

### Other Possibilities

With the above methods of improving traffic flow, we should have an adequate street system for many years. However, there are other possibilities that should be explored, such as the separation of vehicular and pedestrian traffic within the central business district; streets set aside for the exclusive use of transit vehicles; lanes on major arterials used exclusively by transit vehicles; freeways designed to include transit usage; and keeping highways operating at their design capacity.



● PROPER lane lining increases arterial street capacity.



● WIDENING is another way of increasing street capacity.



# TRICKLING FILTERS

## *are the Answer to DALLAS*

## Sewage Treatment Problems

**CECIL H. WILLIAMS,**

Supervisor of Sewage Treatment

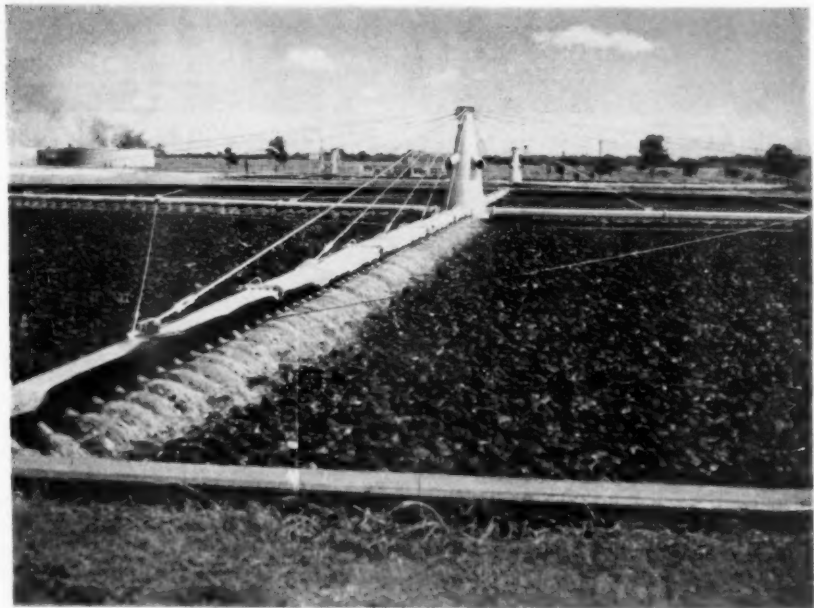
**HENRY GRAESER,**

Superintendent,

Dallas City Water Works

Photographs by C. D. Bayne

**D**ALLAS IS SOLD on trickling filters! Its first trickling filter plant, constructed in 1940, included 24 Imhoff tanks dating back to 1917; with a new battery of rectangular primary settling tanks with separate sludge digestion plus trickling filters and final sedimentation. The original standard rate trickling filters, sixteen in number, were 176 feet in diameter, with an average depth of 7½ feet, and were equipped with rotary distributors. While these facilities, when completed, had a nominal capacity of 32 mgd, the plant had a hydraulic capacity of 50 mgd which has been utilized to the fullest extent since 1950. Under these overload conditions it was found that the trickling filters loaded up to and in excess of 1,000 pounds per acre-foot could produce effluent with an average BOD of 27 ppm, an overall removal of approximately 91.5%. To effect these results, recirculation over the filters is practiced only during the periods of low flow. The operation is primarily a single stage operation but piping is such that stage operation can be effected through the trickling filters. The amount of flow coming into the plant has been so great in recent years that this type of operation has not been possible, but in the month of November, 1954, with completion of our new



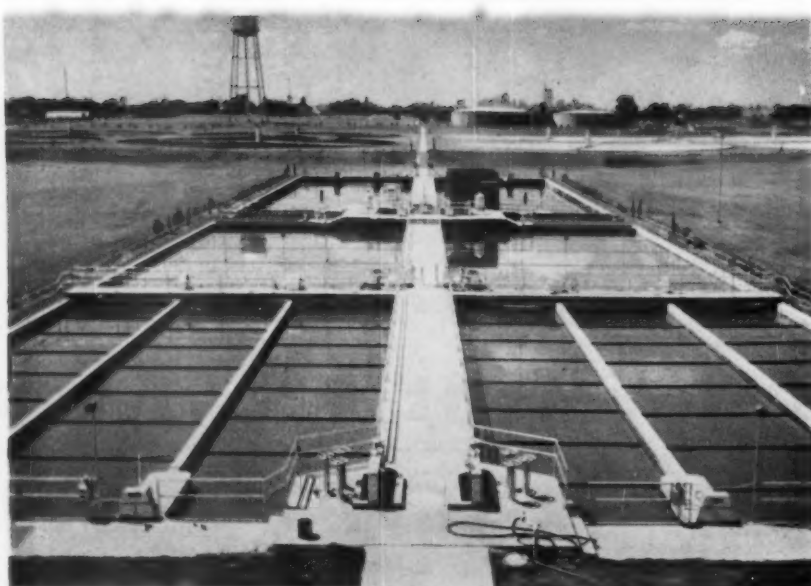
● **TRICKLING** filters, even with heavy organic loadings, have produced remarkable results. This view shows one of the 176-ft. units operating at a higher rate.

plant, we were able to relieve a portion of the flow through the plant in this manner. Stage treatment effected an overall removal of 94.8% through the plant with a final effluent of 20 ppm BOD.

The new 18-mgd White Rock Plant was put into operation January 6, 1954. Although located immediately adjacent to the old plant, it operates as an entity. Basically, this plant is the same as our old plant as it utilizes straight line rectangular settling tanks, both primary and secondary, with 176-foot trickling filters 7½ feet deep. Several important changes were made in the design of this plant, however, based upon our experience in the operation of the old sewage treatment plant. The hydraulic design of the filters was more liberal and larger rock sizes, 3½ to 4½ inches, were used. The maximum design sewage flow of the eight filters was set at 45 mgd. Actually, however, with oversized orifices on the filter arms the eight filters can

carry as high as 100 mgd. We have made test runs on 4 filters at 55 mgd and determined that underdrains just begin to overload at this rate. The plant, however, is nominally sized as an 18 mgd plant with a maximum rate of 45 mgd.

Raw sewage pumps with a total capacity of 134 mgd pick up the plant influent from two major interceptors coming into the plant, pumping to the primary settling tanks. Velocity in the grit channels is governed by automatic control of the variable speed pumps. The mechanical screens and grit channels are located 50 feet underground ahead of these pumps. After primary settling, the sewage passes to an intermediate pump well and is boosted to the trickling filters, returning by gravity to the final sedimentation tanks. The settled sewage pumps have a total capacity of 50 mgd and in the plant operation are utilized to maintain a recirculation ratio of approximately 0.5 throughout the cycle of operation.



● PRIMARY settling tanks are in the foreground. Battery of trickling filters can be seen in background. For the plant layout, see flow sheet on opposite page.

Recirculation is from the underflow of the secondary settling tanks.

When the plant was placed in operation two of the eight filters were equipped with the high rate orifices. Operation was begun with an average flow of approximately 20 mgd with 50% of the flow being diverted to the two filters equipped with the oversized orifices and 50% to the 4 equipped with standard orifices for low rate application. The loadings on two of the standard rate filters ranged from 1,580 pounds per acre foot to nearly 3,000 pounds per acre foot, as shown in Table 1. Flows were maintained for approximately 4 to 6 weeks on each test. It may be explained at this point that a tie line was built connecting the new plant to a pump station formerly serving the old treatment plant. In this manner a portion of the sewage flow from one major interceptor can be diverted to either plant, and thus the flow to the new plant was varied from approximately 20 mgd average to 32 mgd. Nitrification in the high rate section was relatively low, as might be expected, averaging 1.5 ppm for

the entire month; but the BOD of the effluent averaged only 7 ppm in excess of the low rate section. After the seven months run, shown in Table 1, additional high rate, or oversized orifices were purchased and two additional filters equipped. Then the entire low rate section was valved off and the total flow passed through four filters. Recirculation rates have been varied on six weeks intervals up to as high as a total application to the filters of 46.6 mgd. The results of these studies are shown in Table 2. These results have undoubtedly been aided by a high percentage of BOD and suspended solids removal in the primary settling tanks. The average raw sewage suspended solids was 331 ppm. Primary tank effluent suspended solids averaged 97 ppm, to give 71% removal, in the primary tanks, despite relatively short detention periods (60 min. @ 34 mgd) experienced during an overload averaging nearly two times the plant design. Total solids of the primary tank sludge averaged 5.61%.

Plans at this time are being made to add an additional 36 mgd capacity

to the plant to triple the present capacity. Our experiments with single stage standard rate filters have led our thinking towards conversion of the entire unit to two stage, high rate primary and low rate secondary trickling filters. We believe that an arrangement of this type without intermediate settling, utilizing the 8 existing trickling filters and adding approximately 10 additional 176-ft. filters, plus appropriate primary and secondary sedimentation settling basins, will produce a final effluent of 20 ppm approximately, with sufficient nitrification for dry stream discharge. The existing eight standard rate filters will have four additional units, making a total of 12 176-ft. low rate filters. A new section of six 176-ft. high rate filters will be constructed for primary stage treatment. Thus the conversion to two stage treatment will reduce by six the total filters originally planned for expansion of the plant to 54 mgd capacity.

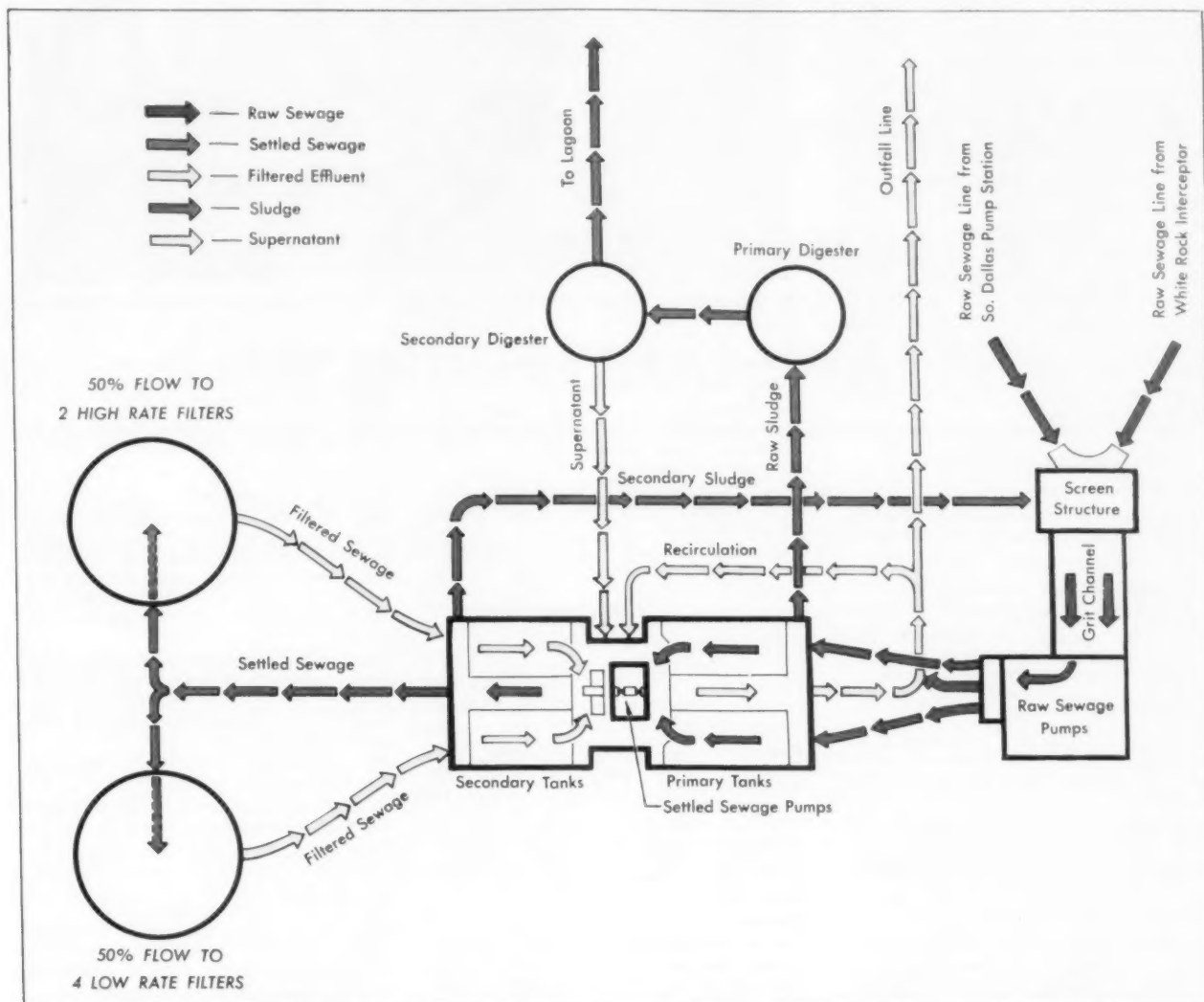
The master plan for the White Rock Plant and design of the original 18 mgd unit was prepared by the Dallas firm of Powell & Powell, Consulting Engineers. This same firm designed and supervised construction of Dallas' original trick-

TABLE 1A—Low Rate Operation

Operating Data on Four 176-Ft. Filters Flow & Recir. Ratio same as Table I			
	Dos. R. MGAD	BOD lb/Ac. Ft	Effluent PPM
1954			
June	7.65	830	27.0
July	7.5	995	36.0
Aug.	8.45	790	29.0
Sept.	9.0	1160	40.0
Oct.	8.5	1040	31.9
Nov.	10.6	1325	25.0
Dec.	10.6	1490	41.0
Avg.	8.9	1090	32.8

TABLE 1—Operating Results at Heavy Loadings, Dallas White Rock Sewage Treatment Plant

	Sewage Flow and Strength				Operating Data on Two 176-ft. Filters at High Rate							
	Raw Sewage Flow	BOD of Settled Raw Sewage	Total Flow To Filters		Flow to Each Filter				B.O.D. Data			
	Av. MGD	PPM	Lb/Day		Total MGD	Recir MGD	Prim. Eff. MGD	Recir Ratio	Dosing Rate MGAD	Total Loading Lb/Day	Lb/Ac. Ft	Effluent B.O.D. PPM
1954												
June	21.2	158	27,900	34.2	13.0	17.10	6.50	10.6	0.612	13,950	1660	31.0
July	20.8	193	33,400	33.5	12.7	16.75	6.35	10.4	0.610	16,700	1990	45.0
Aug.	19.4	164	26,500	37.7	18.3	18.85	9.15	9.7	0.943	13,250	1580	36.0
Sept.	28.2	166	39,000	40.1	11.9	20.05	5.95	14.1	0.422	19,500	2320	45.0
Oct.	32.1	176	47,000	43.8	11.7	21.90	5.85	16.05	0.365	23,500	2800	38.0
Nov.	31.6	168	44,400	47.2	16.6	23.6	8.3	15.8	0.525	22,200	2650	39.0
Dec.	28.5	211	50,100	47.3	18.8	23.7	9.4	14.3	0.657	25,050	2980	42.0
Avg.	25.9	177	38,328	40.5	14.7	20.1	7.35	12.95	0.59	19,150	2282	39.4



● COLORED lines in this flow diagram show travel of raw and settled sewage, filter effluents, sludge and supernatant.

ling filter installation back in 1940.

Grit channels are two-unit, each 15 ft. by 76 ft., with a bottom width of 8 ft. and a maximum depth of 13 ft. With a sewage flow of 45 mgd, using both channels, the velocity is 0.33 ft./sec.; and with a flow of 100 mgd, the velocity is 0.60 ft./sec.

Primary settling tanks are two-unit, each being 50 ft. wide and 180 ft. long, with 12-ft. side water depth. At a flow rate of 18 mgd, detention time is 130 minutes.

Filters are 8 in number, each 176 ft. in diameter and 7.5 ft. deep. The total area is 4.45 acres and the total volume 53,810 cu. yards, or 33.35 acre-ft. Normal maximum hydraulic flow is 45 mgd.

Secondary settling tanks are two-unit, each 50 ft. wide and 150 ft. long, with 11-ft. water depth. Detention time at 18 mgd is 100 minutes.

Digesters, two in number, are each 85 ft. in diameter and 40-ft.

sidewall depth, with a total volume of 450,000 cu. ft.

A lagoon is available for sludge storage. This has a capacity of 5 million cu. ft.

Flow Data—The normal flow, without diversion from the old plant is: Minimum dry weather 11.3 mgd; average dry weather 21.4 mgd; peak dry weather 41.5 mgd.

Operation Data, April, 1955—During April, 1955, average flow including diversions from the old

TABLE 2—Operating Data—Four 176-ft. Filters, High Rate Operation

1955	Raw Sewage Flow Average MGD	BOD of Settled Raw ppm	Lb/day	Total Flow To Filters Total MGD	Recir. MGD	Dosing Rate MGAD	Loading BOD Lb/day	Lb/ac. ft	Effluent BOD ppm
Jan.	20.4	148	25,200	40.5	20.1	18.2	30,970	1,840	35
Feb.	22.8	170	32,300	40.8	18.0	18.3	36,900	2,251	36
March	21.2	182	32,300	39.6	18.4	17.8	37,400	2,226	34
April	33.8	184	51,800	46.6	12.8	20.9	57,200	3,404	51
May	30.1	194	48,600	45.7	15.6	20.6	55,860	3,320	42
Average	25.7	176	38,040	42.6	17.0	19.2	43,666	2,608	40



plant, was 33.8 mgd. Plant influent characteristics and removal by the treatment processes were, in ppm and percent reduction: Suspended solids 399 and 98.6%; BOD 325 and 84.2%; settleable solids 14.3 and 98.6% ammonia nitrogen 19.6 and 0.02%; total organic nitrogen 20.6 and 66.5%; oxygen consumed 135 and 66.2%. Average figures for 1954 showed that the primary tank sludge had a pH of 6.1, a solids content of 5.5% and volatile dry solids of 80.6%. The pH of the digested sludge averaged 7.0 with 5.8% solids and 55.4% volatile dry solids. For the supernatant, the figures averaged 7.2, 0.8% and 58.5%.

### Equipment Data

#### Raw Sewage Lines

Two concrete interceptors; elliptical design but equivalent to 84" diameter pipe.

#### Screening and Grit Removal

##### Jeffrey Mfg. Co. equipment

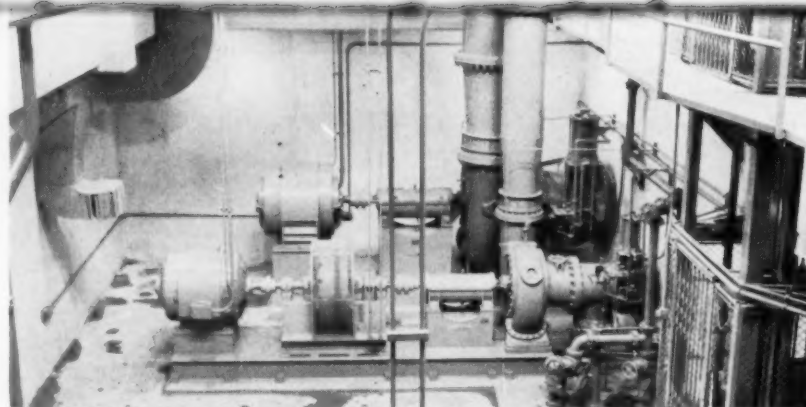
Two 8-ft. vertical back-cleaned bar screens with one-inch clear openings between bars; one 14" belt conveyor with each screen; one 50-hp screenings grinder.

Two straight-line grit collectors 8 ft. wide, using 110 Herc Supermal chain with 8" channel iron scraper flights, 76 ft. long.

Two vertical bucket grit elevators, 110 Herc Supermal chain with one style D bucket every second link; capacity 111 cu. ft. per hour per elevator.

One No. 4 Jigrit washer.

One vertical bucket-washed grit elevator, using No. 124 Reliance Supermal chain with bucket every second link, 25 ft. long.



● PUMP room, showing Economy pumps with E-M variable speed magnetic couplings.

#### Primary Tank Sludge Collectors

##### Jeffrey Mfg. Co. equipment

Six straight-line sludge collectors (three per tank), 180 ft. long with 6" redwood flights every 10 ft.; 720-S Supermal chain.

Two cross collectors, 50 ft. long with 6" redwood flights every 5 ft.; 720-S Supermal chain.

Two scum collectors, 50 ft. long with 6" redwood flights every 5 ft.; 720-S Supermal chain.

#### Secondary Sludge Collectors

##### Jeffrey Mfg. Co. equipment

Six straight-line sludge collectors, (three per tank), 150 ft. long with 6" redwood flights every 10 ft.; 720-S Supermal chain.

Two cross collectors, 50 ft. long with 6" redwood flights every 5 ft.; 720-S Supermal chain.

#### Filters

Eight Dorr type KC2A distributors, 176 ft. in diameter; maximum capacity 13,000 gpm; nominal capacity 7800 gpm.

#### Digesters

Two 85-ft. diameter with PFT floating covers and gas handling equipment, flame traps, pressure regulators, vacuum relief devices, etc.

Two PFT external sludge heaters, each having a heat transfer capacity of 1,000,000 Btu per hour.

Two Weinman 500-gpm sludge recirculation pumps with non-clog impellers.

#### Pumping Equipment

Four Economy mixed flow centrifugal raw sewage pumps; two constant speed and two variable speed with Electrical Machinery variable speed magnetic couplings. Total pumping capacity is 134 million gallons per day for the four pumps.

Three Fairbanks-Morse vertical constant speed settled sewage pumps. Total capacity is 46 million gallons per day.

Two Carter positive displacement 500-gpm sludge pumps.

Two Weinman centrifugal 500-gpm sump pumps.

One Weinman centrifugal 500-gpm skimmings pump.

Four R & S rubber lined butterfly valves, with hydraulic control; one 24", one 42" and two 30"; one on suction side of each raw sewage pump.

Four R & S rubber lined butterfly valves, manually operated; one 24", one 42" and two 30"; one on discharge side of each raw sewage pump.

One Yeomans Bros. Shone type SDV ejector for conveying screenings, grit washer effluent, etc., with 60-lb. water cooled air compressor; pump rated at 100 gpm at 60-ft. head.

#### Switch Gear

##### Nelson Electric Co.

Indoor metal clad panels consisting of eight cubicles for control of 2600-volt circuits.

Indoor metal clad panels consisting of 17 cubicles for control of 440-volt low-voltage circuits.

One 500-KVA, three phase delta Allis-Chalmers transformer, 2400-volt primary and 480-volt secondary.

One 37½-KVA type VTX single phase Allis-Chalmers transformer, 480-volt primary and 220/110-volt secondary.

#### Ventilation

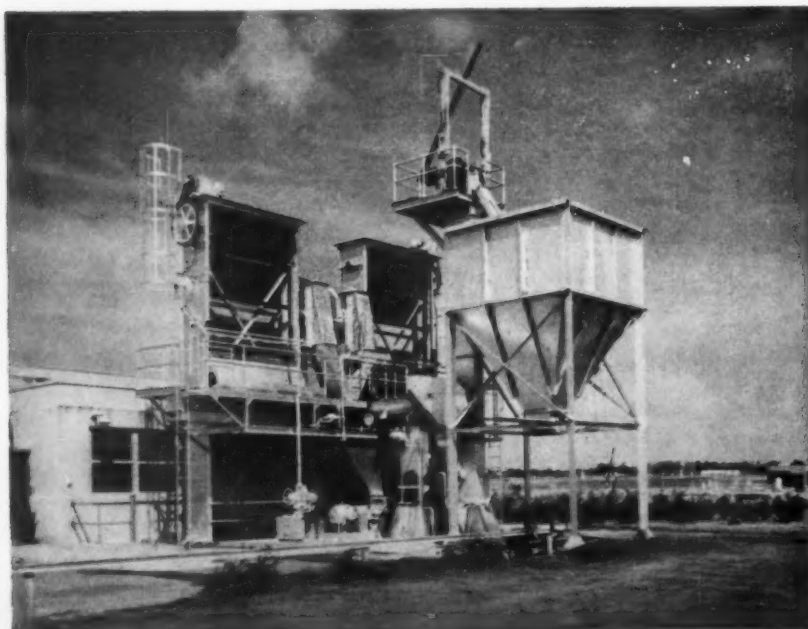
Three Clarage Fan Co. grit channel fans, 55" blades; each 10,000 cfm capacity.

One Clarage V-Belt Ready Unit blower, size 2¼, type HV; 10,000 cfm capacity at ¾" static pressure.

#### Miscellaneous

One Montgomery Elevator Co. full automatic push button, 1,000-lb. capacity elevator, speed 50 fpm.

One P & H Trav-Lift electric crane, 15-ton capacity.



● SCREENING and grit removal equipment includes bar screens, screenings grinder, grit collectors and grit washer. A corner of sewage pumping station is at left.

# HOW CHARLOTTE PROVIDES COMPLETE TREATMENT FOR COMBINED DOMESTIC AND INDUSTRIAL WASTES

## WALTER M. FRANKLIN

Superintendent, Water Department  
Charlotte, N. C.

**T**HE SECOND addition to the Sugaw Creek Sewage Treatment Plant was placed in operation during the month of July 1955. An unusual feature of this installation is that it was designed to treat combined domestic and industrial wastes, under the terms of a City Ordinance regulating the use of the sanitary sewers. The total cost of this addition was approximately \$3,500,000; some \$500,000 of this amount is attributed solely to the treatment of industrial wastes, discharged into the sewer system under controlled conditions as stipulated by the Ordinance.

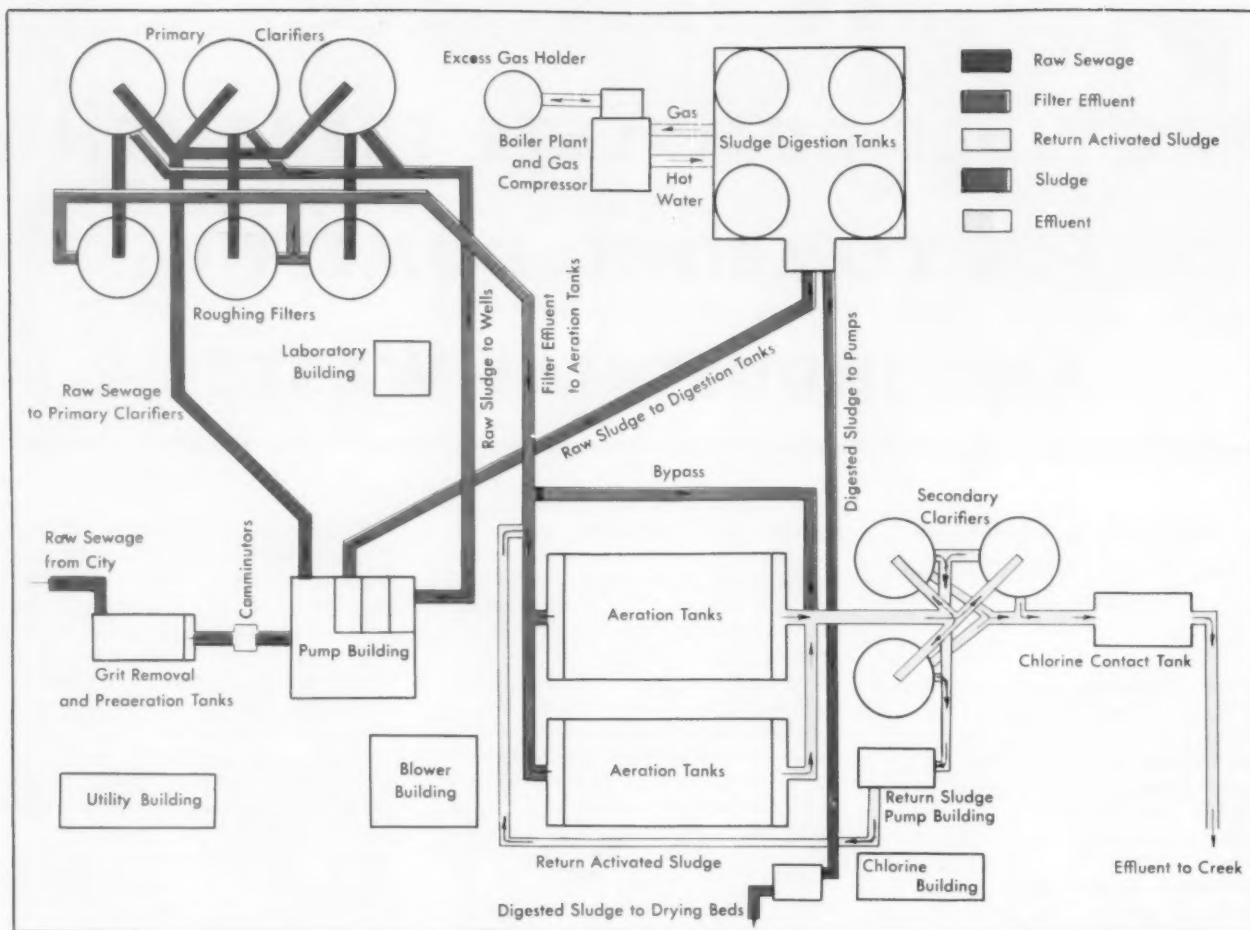
The original Sugaw Creek Sewage Treatment Plant was built in the early 1920's, but by 1924 was inadequate. An addition was made to the original plant and placed in operation in 1928. This, designed by Wm. M. Piatt, Consulting Engineers of Durham, North Carolina, (now operating under the name of Piatt and Davis), provided a capacity of 5½ mgd of domestic sewage. At that time industrial wastes were not allowed in the sanitary sewer system of the City. This old plant, consisting of grit and screening removal units, primary sedimentation, aeration units, final sedimentation, separate sludge digestion and open type sludge drying beds, produced an excellent effluent until it became overloaded due to the rapid growth of the City's population and to the introduction of some industrial wastes without control into the sanitary sewers. The presence of these wastes severely hampered the proper operation of the activated

sludge plant. Industrial plants not utilizing the sanitary sewer system were discharging their wastes into Sugaw Creek, a small stream meandering through the center of a highly populated area of the City. Constant complaints of odors emanating from Sugaw Creek, due to the presence of these wastes, led to a movement to clean up the stream. The result of this movement was the Ordinance mentioned above, adopted in 1950, providing for a co-operative effort in the removal of wastes from Sugaw Creek and establishing a control method for the treatment of such wastes in a combined domestic and industrial wastes plant. The industrial waste control ordinance was adopted after a very comprehensive industrial waste survey was made, covering the entire City, by Alvord, Burdick,

and Howson, of Chicago, Illinois. The problems arising in connection with the adoption of such an Ordinance delayed the design of the treatment plant for a period of almost two years. J. N. Pease and Company, Architects and Engineers, Charlotte, North Carolina, were then authorized by the City Council to design a combined treatment plant, the capacity of which would be sufficient to handle the additional load contributed by the introduction of industrial wastes into the sanitary sewer system, under the terms of the Ordinance. Contributing industries are obligated to pay a fixed charge based on the strength of their wastes in pounds of BOD for the purpose of amortizing the extra construction costs made necessary due to the presence of industrial wastes in sewers. In addition to



● ONE OF the three final clarifiers in foreground; digesters, gas holders and stack for boiler house top right; laboratory in center; pump house at top left.



● LAYOUT of Charlotte plant. Colored lines show flow of sewage through the various treatment units of this modern plant.

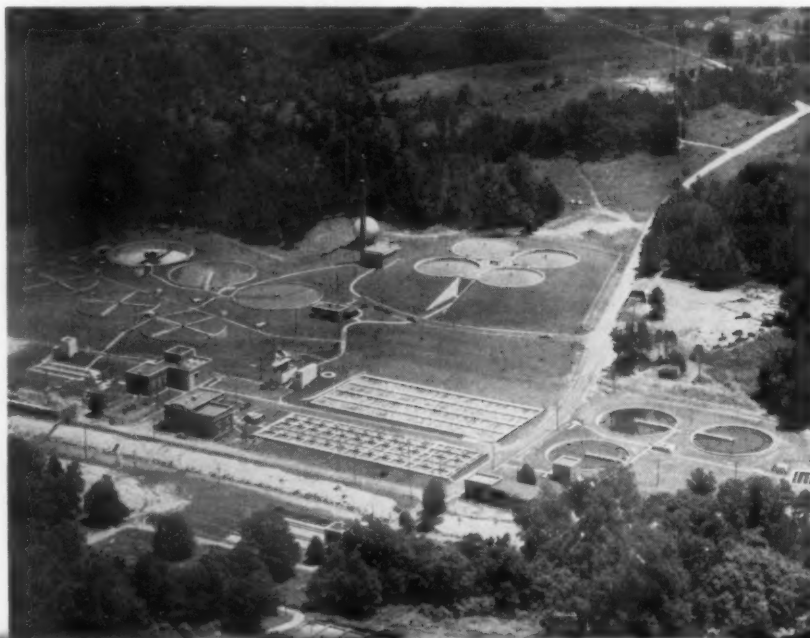
the fixed construction cost amortization charges, each contributing industry is also obligated to pay a monthly operating surcharge based on the BOD loading at the point of introduction of the wastes into the sanitary sewers.

### General Design

The capacity of the now completed combined plant is based on a 24-hour average day discharge of 11,000,000 gallons, a 24-hour maximum day of 14.0 million gallons, a maximum 8-hour average day of 14.6 million gallons, a maximum 4-hour average day of 15.0 million gallons, and a peak load of 21.5 mgd. The BOD loading used in the design was 250 ppm for domestic sewage and 652 ppm for industrial wastes. It was estimated that by 1960 the contributing population, with regard to domestic sewage, would be approximately 114,000. The industrial wastes equivalent population loadings by the same

date would be about 63,000, making the total equivalent population to be served in 1960 to be an estimated 177,000. Using a BOD loading of 0.17 pound per capita, it was determined that the BOD loading for design purposes in 1960 would be approximately 30,000 lbs.

Preliminary treatment is provided by a grit removal unit, utilizing diffused air. Screenings are handled by twin comminutors, one new and one old unit, supplemented with bypass screens. Both comminutors are furnished by the Chicago Pump Company, the new one being size



● AIR view of part of Sugaw Creek plant with aeration units in center.



36-A and the existing unit removed from the old plant being size 25-A. The influent is measured by means of a Parshall flume, combined with indicating and recording instruments.

Primary treatment is provided by three new primary clarifiers utilizing Dorr equipment. The existing clarifier was abandoned due to size, location, and condition of equipment. Each of these circular units is 110 feet in diameter with a side water depth of 9 feet, providing an overflow rate of 800 gallons per square ft. per day. These provide for 11 mgd of influent plus 11.0 mgd recirculation, plus 0.1 mgd excess activated sludge and 0.1 mgd supernatant liquor return. Intermediate treatment is provided by three high rate trickling filters, or roughing filters. It is anticipated that these filters will serve to level off the peak BOD loadings imposed on the plant by industrial wastes. Each of these filter units is 105 ft. in diameter with a media depth of 4-ft. 3 ins. and a combined total area of approximately 26,000 square feet. They are of sufficient capacity to allow for a maximum rate of recirculation from the primary clarifier at the ratio of one to one. The BOD loading is estimated at approximately 9,000 lbs. per acre-foot per day. Variable speed vertical type centrifugal pumps are used in the required pumping of influent to the primary clarifiers and in providing for recirculation to the roughing filters. The raw sewage pumps are automatically controlled utilizing floats in the wet wells.

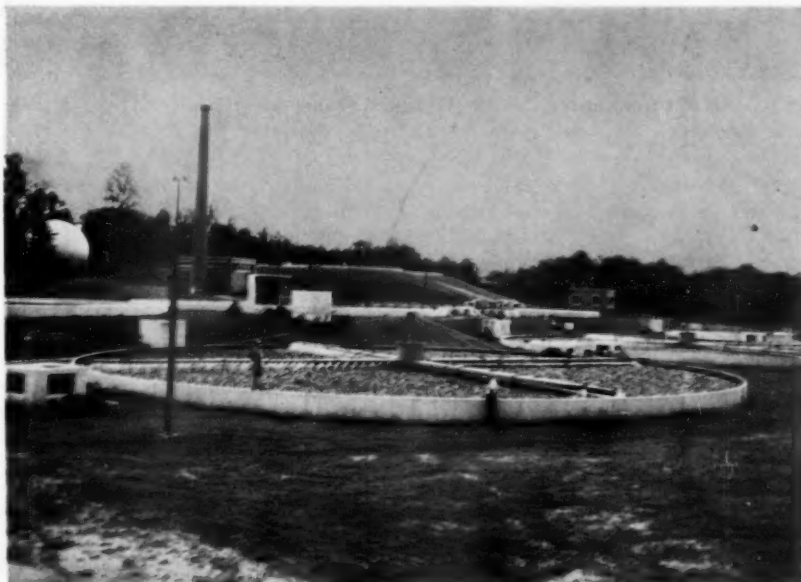
Four new aeration units, having a capacity of approximately 366,000 cubic feet, have been provided for the production of activated sludge. The existing five aeration units, containing approximately 215,000 cubic feet, have been re-equipped with new aerators. One each of the new and old aeration units is equipped for utilizing the Kraus Interchange Process. The new aeration tanks will be supplied with air by three new Standardaire rotary type blowers powered by variable speed motors. The old aeration units will be supplied with air from the three existing De Laval two-stage centrifugal type blowers. Blower capacity sufficient to supply approximately 2.9 cubic feet of air per gallon is available. Chicago Pump Company Swing Diffusers have been installed in both the old and new units using Saran wrapped diffuser tubes. The swing diffuser type equipment was used in order to provide easy access to diffuser

units for cleaning. The previously used ridge and furrow type diffuser units, while being very efficient, were quite troublesome to clean in the case of clogging. We anticipate some difficulty from clogging due to the presence of industrial wastes. Foam control has been established by means of the installation of spray nozzles throughout all aeration units. Effluent from the roughing filters is pumped directly into a separate piping system for use in providing the necessary water for foam control. An attempt was made to operate the plant without the use of foam control. This experimental operation did not prove successful; however, it did justify the cost of installing the water spray

plant efficiency of BOD and suspended solids removal between 90 and 95 percent.

Raw sludge is drawn intermittently from the primary clarifiers by gravity to sludge storage tanks where the sludge is treated as required with hydrated lime mixed by means of air diffusers and pumped by positive displacement pumps directly to the sludge digesters. Activated sludge from the final clarifiers is pumped by vertical type centrifugal pumps to the head end of the aeration units or to the primary clarifiers or a combination of both, or to the tanks equipped for utilizing the Kraus Interchange Process.

Sludge digestion capacity of ap-



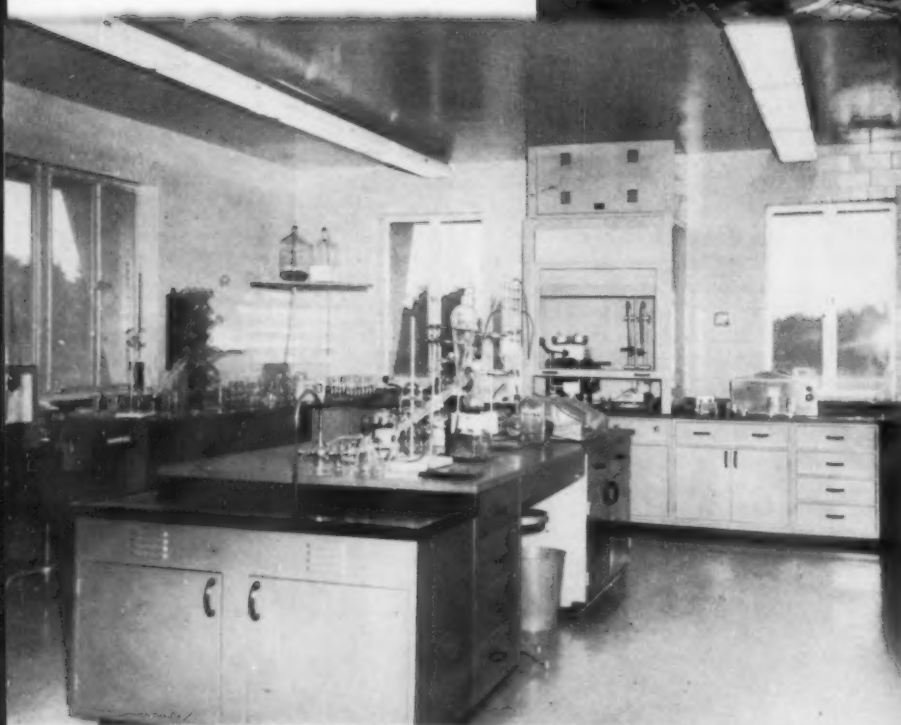
● HIGH RATE trickling filters in immediate foreground and to right. Just beyond are three primary clarifiers, gas holder, digesters and laboratory building.

system. Diffuser tube washing equipment has also been provided.

Secondary treatment is provided for in the form of three new circular final clarifiers furnished with Dorr equipment. These units are 85 ft. in diameter each with a side water depth of 8 ft. 6 ins., with an overflow rate of 650 gallons per square ft. per day, based on the 24-hour average day design. The total surface area furnished is approximately 17,000 square feet.

The effluent from the final clarifiers is discharged through a chlorine contact chamber having an average detention time of 30 minutes and a peak flow detention time of 15 minutes. It is anticipated that chlorination of the final effluent will be necessary during the period when the receiving stream is low. We expect to maintain a total

proximately 4 cu. ft. per capita is provided, partially in the existing fixed cover, unheated type digesters and also by means of four new circular units equipped with floating covers with provision for heating the sludge, by utilizing the gas produced in the digestion process. Recording temperature gauges and CO<sub>2</sub> analyzing equipment are provided in connection with the new units. The new digestion units are 85 ft. in diameter each with a side water depth of approximately 22 ft. 6 ins. Heating of the sludge is accomplished by means of Pacific Flush Tank heat exchangers, located in the sludge digester house. The water for pre-heating the sludge is heated by means of digester gas in boilers located in a separate building located apart from the digesters proper. The gas as taken



● **LABORATORY** provides facilities for controlling plant operation and also for analysis of the industrial wastes to determine charges to be paid by industries.

from beneath the covers is compressed and stored in a Horton-sphere storage tank at about 29 lbs. psi pressure. Explosion proof switches and other similar equipment are supplied throughout the system.

Digested sludge is pumped from the digesters to uncovered sludge drying beds by means of two plunger type sludge pumping units. The existing and new drying beds have a total area of approximately 310,000 square ft. New beds supply 260,000 ft. of this amount. All the drying beds are equipped with underdrain systems and the new beds are also equipped with Link Belt traveling conveyor belt, provided to facilitate sludge removal. Dried digested sludge is disposed of by the sale to landscapers and to citizens in bulk to be utilized as fertilizer.

#### **Laboratory Facilities**

A separate laboratory building complete with equipment of modern design has been provided for making the analyses needed in controlling the operation of this combined plant. Also analyses of trade wastes, under the terms of the Ordinance, will be made in the laboratory.

In order to arrive at the correct surcharges to be paid by each contributing industry, the volume, strength, chemical and physical characteristics of the wastes will be

determined by sampling at each point of contribution by industries. The equipment to be used for the proper sampling and measurement of industrial waste flows is furnished by the City. The necessary equipment has been mounted in mobile units consisting of small house type trailers. Two of these units will be used in the sampling program. The industries discharging wastes into the sewer system will build, under the terms of the Ordinance, standard type weir boxes and measuring devices equipped in such a manner that the City's mobile measuring units may be readily used in obtaining measurements with the equip-

ment furnished in the trailer unit.

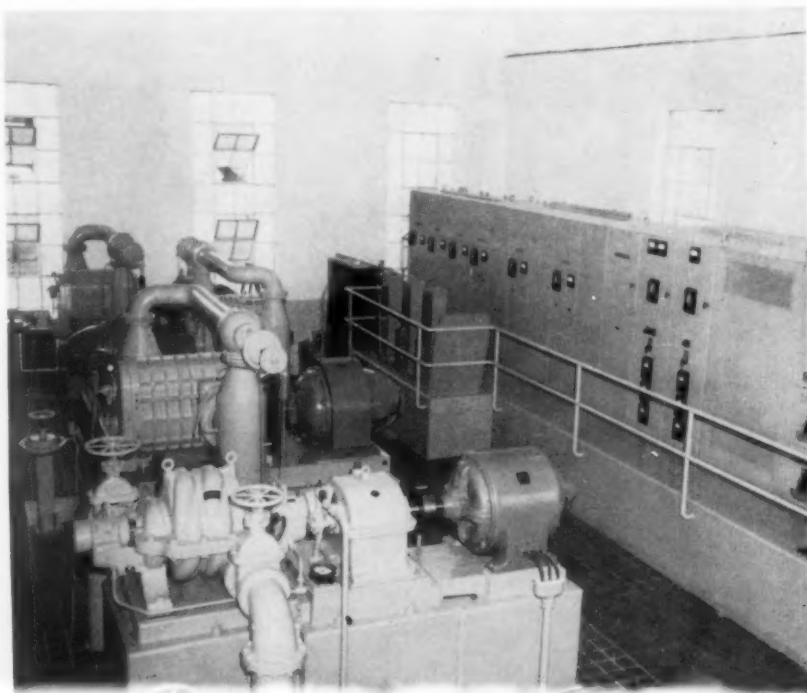
The remaining drainage area, upon which the City of Charlotte is located, utilizes a second sewage treatment plant, known as the Irwin Creek Sewage Treatment Plant. This plant is also being expanded in similar fashion. It is anticipated that this new addition will be ready for operation by April 1956. This plant was also designed and is being constructed under the supervision of the J. N. Pease and Company of Charlotte, N. C.

The Sugaw Creek plant was designed, constructed and supervised by J. N. Pease and Company, George S. Rawlins, Vice President, Chief Designing Engineer; Resident Engineer was Fred Hobson; E. L. Blackwelder is Chief Operator for the City of Charlotte. We wish to acknowledge the assistance rendered us in the collection of this data by Mr. Rawlins, Fred Hobson, and R. S. Phillips, Assistant Superintendent, Water Department. The plant will be operated under the supervisory staff of the Water Department by E. L. Blackwelder, Chief Operator, assisted by the staff, consisting of six operators, one chemist and nine operator helpers.

#### **List of Contractors and Equipment Manufacturers**

General Contractors: V. B. Higgins Company, Greensboro, North Carolina  
Electrical Contractors: Austin Electric Company and Todd Electrical Company, Charlotte, North Carolina  
Electrical Switchgear: Westinghouse Electric Corporation  
Raw Sewage Pump: Worthington Corporation

(Continued on page 169)



● **PORTION** of the compressor house showing blowers and switchboard units.

# RADIOACTIVE FALLOUT

## ... A PLAN FOR PROTECTION

**WILLIAM N. LONG,**

Director of Sanitation,

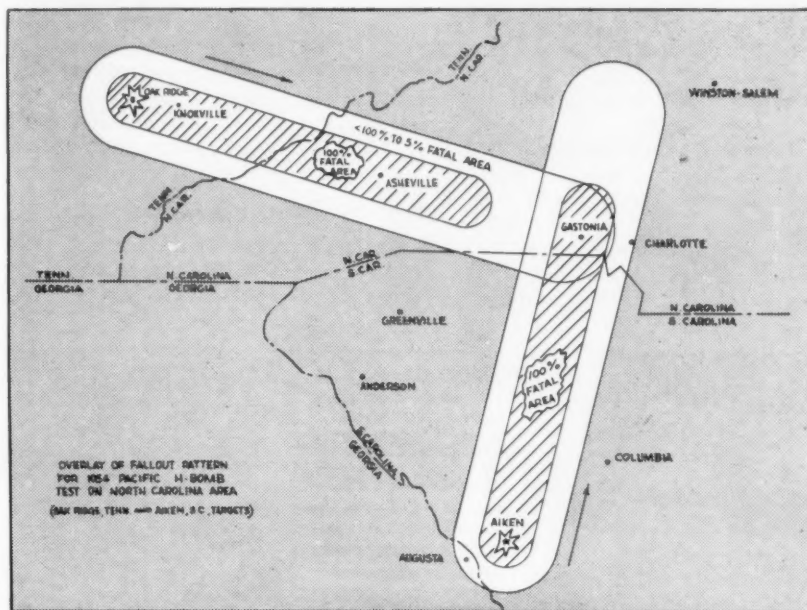
Gaston Co. Dept. of Health, N. C.

**W**HAT PLANS have your city made for protection in case of an atomic attack? Has your county government provided for a salaried Civil Defense Director? Does your area have a Civil Defense budget, or is the entire organization voluntary? To quote Elmer Davis in his book *Two Minutes Till Midnight*,—"nobody wants to read about the hydrogen bomb, or even to think about it. But it will still be there, whether we think about it or not—perhaps especially if we don't."

Is radioactive fallout dangerous? This question has been answered as a result of experiments conducted in Nevada and the Pacific areas during the past few years. It has been determined that the fallout of radioactive material may present a very definite survival hazard to the population exposed.

The Atomic Energy Commission has informed us that a dosage of 400 roentgens would probably prove fatal to some 50 percent of the people so exposed and that a dosage of 600 roentgens or more would probably prove 100 percent fatal. In the 1954 Bikini Atoll thermonuclear tests an area extending approximately 160 miles downwind and up to 40 miles in width was heavily contaminated. This area showed a 500 roentgens or more cumulative dose exposure 24 to 48 hours after the detonation. In all, a total of approximately 7,000 square miles of territory was so contaminated that survival would depend upon the most prompt protective measures. Yes, radioactive fallout presents a very definite problem.

When an atomic or hydrogen bomb explodes there are several effects: Tremendous heat is generated. The temperature of this fireball exceeds many times that of the sun. The area of the fireball may cover an entire city. Brilliant light is given off by the detonation. At a distance of five miles from the blast an individual could be permanently blinded if he were facing the point of explosion. Blast waves are



● PATTERN of radioactive fallout developed at Bikini tests is plotted with Oak Ridge and Aiken as targets to show how Gastonia might be affected by either.

created. These waves cause extreme damage within ten miles of point zero. Radiation is created in the form of an atomic cloud. Radioactive particles and rays are also given off at the point of explosion.

The odds are on your side against an atomic or hydrogen bomb hitting your city. If such occurs, your problem is simplified, for there is, as yet, no known method of satisfactory protection except evacuation. However, a bomb can explode hundreds of miles away and present a serious survival hazard to you and your neighbors. Remember, the effects of the heat, light and blast are instantaneous effects. The effect of radiation may be prolonged—possibly for many days.

What then can we do? We can provide for adequate warning systems to enable us to receive advance information regarding the possibilities of radioactive fallout. We can provide a well organized Radiological Safety Team for our area, a team equipped and trained to go into protective action when danger threatens. We can do all this with relatively little cost—but whatever the cost, it's the least we can do. Money should be no thought when weighed against human lives.

Every city or county has the basic

elements necessary to provide for the protection of its inhabitants. Each has a police force, a fire department, volunteer civil air patrols, engineers and public health and medical workers. What then are the necessary ingredients?

The basic requirements are: (1) an adopted plan (2) a full-time, salaried Civil Defense Director (3) an adequate budget (4) volunteer workers. In discussing these four basic requirements let me say that all of these are necessary—no one is greater than another.

No organization can function properly without a plan of operation. A radiological safety program is no exception. As radiological safety, however important, is only one phase of Civil Defense preparations, it is necessary to have a coordinator available, a Civil Defense Director. It is possible to operate this program on a 100 percent voluntary basis, but it would be much more difficult.

A budget is necessary. Radiation safety cannot be determined without the use of radiation detection instruments. The number necessary varies with the area and population to be protected and, of course with the amount of money available. A major part of the radiation safety



program will depend upon training of key voluntary personnel. Short courses should be given in the use of radiac instruments and in basic radiation principles. Bulletins need to be printed. Stenographic assistance will be needed. All of these items require a budget.

With a well organized plan of attack, a radiation safety program can obtain its voluntary workers. There is one thing about the subject of radiation and the use of radiac instruments—people are interested. When the plan has been adopted, a leader selected, a budget provided, the voluntary workers will not be missing.

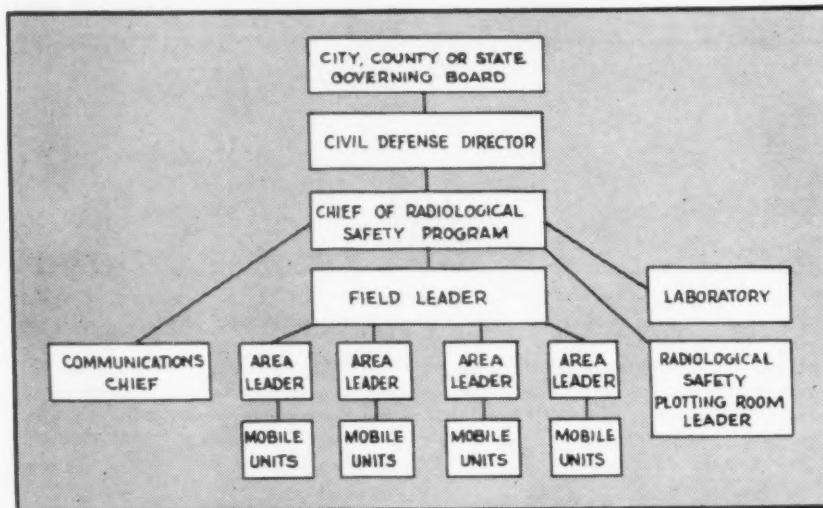
The overall program objectives of a city or county-wide plan would be to: (1) Verify the radiological

be necessary and practical clearly to delineate the situation.

To accomplish this it will be necessary to: (A) Determine airborne and surface radiation levels. (B) Record size, shape and duration of fallout pattern by ground and serial surveys. (C) Maintain fallout maps indicating the integrated dosage and radiation intensity levels at each location. (D) Assure public safety. This includes adequate warning of radiation hazard areas, checks of food and water supplies and such additional checks and contacts as are warranted by a situation.

### Organization

Every program requires a leader. In this case such a leader would be the Chief of the Rad-Safe Group,



● CHART of organization for radiological safety as developed by Gaston County Health Department to provide an area set-up for tracking down possible fallout.

situation resulting from a nuclear detonation. (2) Hold trained personnel in readiness to put into action emergency measures prescribed by the Atomic Energy Commission and the Federal Civil Defense Administration. (3) Obtain complete records of radioactivity. (4) Establish and maintain public confidence that all reasonable safeguards are being employed to preserve public health and thereby inspire the respect and confidence of the citizens of the city or county.

In planning the allocation of personnel it is recognized that certain limiting boundaries must be realized. For planning purposes the area of one's county may be considered. However, the best interests of a radiological safety program cannot be restricted by fixed geographical boundaries and, as circumstances warrant, the operation should be extended as far as may

an individual with basic training in radiation defense and detection. Perhaps your area already has such an individual. Approximately 55 Public Health Service Inactive Reserve Officers were trained in December, 1954, and during the spring 1955 series of Atomic Tests in Nevada in the basic fundamentals of radiation. These officers are normally employees of local and state health departments and industry. The duties of the Chief would be to exercise general supervision over the entire operation. He would organize, establish and direct procedures, write reports, maintain liaison with other Civil Defense Groups and inform the public of the Radiological Health Plan.

Directly under the Chief of the Rad-Safe Group would be four divisions: (1) Communications, (2) Plotting Room, (3) Field Operations, and (4) Laboratory.

The duties of the Communications Chief are those of co-ordinating all communication facilities. Two general classifications of communications are available in most areas: fixed and mobile. Fixed units would consist of regular telephone, radio, television stations, and "ham" short wave radios. Mobile units would be made up of Civil Air Patrol radio cars, City and County Police radio cars and Civil Air Patrol planes. Privately owned planes equipped with radio facilities could also be used.

The geographical area to be protected by the Radiological Safety Plan would be divided into suitable districts, each district having a leader in charge of mobile units. The Field Operations Leader would exercise general supervision of all district leaders.

These district leaders would be responsible for the operation of all monitoring equipment in their area. They would collect and submit data and reports on their activities, including personal observations. Their duties would further consist of developing sufficient knowledge of their assigned districts to permit them to coordinate and supervise the work of other radiological groups assigned to the district. Routine ground monitoring surveys would be performed, assistance given to other district leaders, and arrangements would be made to implement emergency measures as directed.

The Plotting Room Leader would receive all data from the Field Operations Leader and would prepare all situation maps of fallout areas. He would also prepare all reports pertaining to aerial and ground monitoring. This section would act as the headquarters, as the administrative offices, for the Radiation Safety Plan of operations.

The Laboratory section duties are those of performing the necessary tests to aid in protecting the food and water sources of the area. Additional radiation detection tests would also be performed, such as the "counting" of air sample pads.

### Cooperating Agencies

In planning and establishing a Rad-Safe Program, you will find there are many agencies and institutions which can and will be of invaluable assistance.

The United States Public Health Service Radiological Health Program, under the direction of James G. Terrill, Jr., Chief, can offer assistance in overall program plan-

(Continued on page 168)

- GALION grader shaves off finished base to prepare for surfacing.



## SOIL CEMENT

### *Stabilization in PAMPA*

By JAMES H. COWAN, Director of Public Works, The City of Pampa, Texas

QUITE a few blocks of flexible base pavement, using caliches locally available for the base material, were built by Pampa a number of years ago. These caliches had very undesirable soil characteristics and, as a result, failures in excess of normal expectation occurred in most of these. To remedy this situation, the City began looking around for an alternate to the caliche base in use. Contact was made with the Portland Cement Association and interest in soil-cement stabilization

was established. From this initial contact grew a program that has continued for some fourteen years with highly satisfactory results.

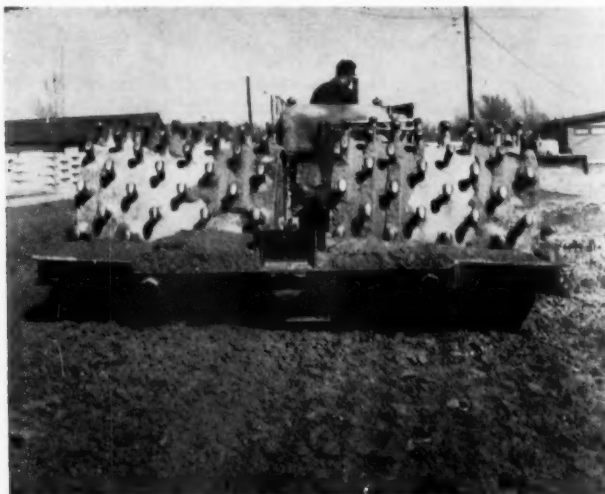
To date, Pampa has completed the construction of some 380,931 square yards of soil-cement streets representing a total of 260 city blocks. At present, the City is in the process of paving an additional 45 blocks using a soil-cement base.

To acquaint readers with our use of soil-cement, a brief statement concerning the native base material

used, the desired end results, and the equipment needed to accomplish this operation is necessary.

The only base materials available to Pampa within a reasonable distance do not possess the desired physical characteristics for a flexible base. However, with the addition of the proper amounts of cement under requisite conditions, this base material can be stabilized. The caliche available to Pampa is more of a sandy clay than a true caliche.

Following is an analysis of the



- SHEEPSFOOT roller, pulled by HD-5 tractor, compacts material previously pulverized and mixed by Pulvi-Mixer.



- PULVI-MIXER is used following plow, after water has been applied, to mix thoroughly base material and cement.

material: gravel, none; sand 2.0 to 0.25 mm, 12 percent; sand 0.25 to 0.05 mm, 46 percent; silt (0.05 to 0.005 mm) 26 percent; clay 16 percent. The Physical Test Constants indicate a liquid Limit of 26, and a P.I. of 11. Additional tests indicated that optimum moisture is 16 percent by weight and that the recommended cement content is 8 percent by volume.

The end result in soil cement stabilization is a dense, cemented soil with improved physical characteristics, serving as a flexible base for an asphalt surfaced street. Three pre-requisites for such soil-cement stabilization are: (1) Proper cement content; (2) proper water content; and (3) compaction.

### Equipment Used

Equipment used in Pampa to stabilize a base material with cement is as follows: Dump trucks to transport cement; a Galion Model 118 maintainer to shape and grade; a Graham-Hoeme plow to break up the soil; an AC HD-5 tractor to pull the plow and the sheepsfoot roller; a Seaman Pulvi-Mixer pulled by an Oliver OC-3 crawler tractor to pulverize and mix the soil, water and cement; a Ford truck with 25-bbl. water tank with spray bar to apply water; a Farmall tractor to pull the harrow and pneumatic roller; a sheepsfoot roller to provide compaction from bottom up; a scratcher to eliminate compaction planes; a Welco, 11-wheel pneumatic roller for the final compaction; a Littleford broom to sweep the surface; a loader to pick up excess material; and an asphalt distributor to apply the RC-2 seal coat.

Certain procedures for the soil-cement stabilization operation have been developed in Pampa. In developing these procedures, Pampa has found a satisfactory means to provide adequate flexible base for its asphalt surfaced streets. These procedures are as follows.

Prior to the soil-cement stabilization, the section to be paved has been excavated to sub-grade; curb and gutter has been run; and the base material has been hauled in and shaped to final grade and crown. The material to be stabilized is "in place" and the procedures to be followed are such as to minimize the displacement of any of this material.

### Chronological Procedure

A typical section to be stabilized could consist of a block 600 feet in length with a width between gutters of 33 feet, in all 2200 square

yards. In order to describe the soil-cement stabilization process, a chronological accounting of events will be noted.

On the day preceding actual stabilization, this block is pulverized and pre-wetted. In order to obtain a uniform distribution of water and a thoroughly pulverized material the section is first plowed using the Graham Hoeme plow pulled by the AC HD-5 crawler tractor. While plowing, water is added from the water truck. The Seaman Pulvi-Mixer is then run over this section at the rate of approximately 40 feet per minute. A second application of water while plowing follows, after which the Pulvi-Mixer is again run over this section. Usually this completes the pre-wetting operation; however, if insufficient moisture is in the soil, this plowing-watering-pulverizing procedure is again followed. Early on the second day, sacks of cement are spaced at pre-determined intervals in order to provide for an 8 percent cement content. These sacks are opened and the cement is then spread through the use of a spike tooth harrow pulled by a Farmall tractor.

In order to mix the cement and the base material, plowing is started immediately after spreading the cement. A water truck follows the plow, applying a controlled quantity of water over the section. After this initial application of water, the Seaman Pulvi-mixer is run over the section at a rate of approximately 40 feet per minute.

The desired results in this operation are two fold: (1) Thoroughly to pulverize and mix all materials for a depth of approximately six to eight inches; and (2) to obtain an optimum moisture content uniformly over all of the section being stabilized. In order to do this the plowing-watering-pulverizing cycle is repeated two or more times. During this operation, a grader pulls the soil-cement mixture away from the curb for a width of 18 to 24 ins. This material is given additional plowing, watering and pulverizing and is then bladed back into place, and the over all operation is continued. After thorough mixing has been completed, and optimum moisture has been obtained, the section is again shaped with the motor grader.

By this time, it is mid-afternoon or later. Since the first two pre-requisites for a soil-cement stabilized base have been satisfied, the third, compaction, now remains. A sheepsfoot roller pulled by the crawler tractor is then put on the

section. Rolling continues until the sheepsfoot roller has "walked" two-thirds out. At this point, the maintainer shapes the section for the final time. Sheepsfoot rolling continues. In order to eliminate compaction planes, a scratcher is used in the last stages of this rolling.

When the sheepsfoot roller has walked completely out, it is removed from operation and the pneumatic tired roller is placed on the section. This rolling continues until the base has "set-up".

It might be pointed out that periodically during the two rolling operations, moisture lost due to evaporation has to be replaced by light applications of water from the water truck. The number and frequency of these applications vary with atmospheric conditions. The ultimate result is to maintain optimum moisture in the soil-cement until the job is completed.

After the base has set up there are still minor ruts, bumps and other irregularities in the surface. In order to eliminate these, the maintainer "shaves" the base, leaving a smooth, uniform surface.

Like concrete, a soil-cement base needs to "cure". In order to cure properly, this base must not be allowed to dry too quickly. In order to seal in this necessary moisture, the last operation in completing this process is accomplished by an application of cutback asphalt. In Pampa, RC-2 is used and is applied at the rate of approximately 0.4 gallon per square yard. This rate affords a good sufficient coverage to seal the base completely. Because it may be several months before a "double asphalt surface treatment" is applied to this base, this RC-2 seal also affords a wearing surface for traffic.

Those in Pampa who have been associated with this program feel that in soil-cement they have a base for city streets that is unrivaled. To those communities with a flexible base problem, Pampa recommends soil-cement.

• • •

### Materials Salvaging at Refuse Disposal Area

A contractor will salvage waste material at the Surfside, Fla., refuse disposal area. The agreement provided for two months of trial operation, during which the contractor paid the community \$200 per month. During this trial period, evaluations were made of the salvage process and the monthly payment will be modified accordingly.



## SEWERAGE IN A WARTIME BOOM AREA

**T**WO formerly small Georgia communities, originally sparked in their growth by World War II, have merged and are now constructing a comprehensive sewerage system and making other municipal improvements. When the Air Force started an air-base development there around 1943, Wellston and Warner Robins were typical sleepy unincorporated and unimproved villages, with very inadequate sewerage and water systems.

The resulting development was typical of war time. Thousands of service men moved in, many bringing their families; as always, civilian population increased proportionally with the military. There were neither local funds nor materials to construct facilities to serve the people. As a first step, Wellston was annexed and Warner Robins was incorporated. Civil and military authorities cooperated to provide sewers to some areas of the community. When the war ended and, as in most war time areas, activity receded, Warner Robins did not quite revert to its pre-war status of a rural Georgia town. Nearly 3,000 families remained in the area, but the pressure for improvements was gone.

Then came the Korean war and the air base outside of Warner Robins was reactivated. Soon there were

16,000 military personnel in the area, plus an estimated 17,000 civilians. Even for this, the sewerage system was fairly adequate, at least by boom development and war time standards.

Now comes the Navy with a program for a big naval depot. Located six miles west of the city and estimated to cost \$65 million, this depot will give peacetime employment to 6,000 persons. This means a population increase in the area of some 20,000, a good part of which can be expected to locate in Warner Robins.

Before Warner Robins Field was built, the city did not have municipal water supply or sewage treatment facilities. The military provided water and also arranged to treat the sewage. But when the air-base was reactivated in 1950, personnel increases necessitated virtual elimination of air-base service to the city facilities. At this time, there were 14,000 ft. of vitrified clay pipe in the municipal system; 47,000 ft. of sewers serving a government housing project; and 53,000 ft. installed by the Fickling Walker Company to service its development. The same company had 48,000 ft. of water mains, while the city had 20,500 ft., mainly on the original city streets.

A new \$2 million program to

meet its needs was developed by the city, with Vinson & Company, Inc., Atlanta, Georgia, as architect-engineer. The project included 96,000 ft. of vitrified clay sewer, up to 30-inch in size; a sewage treatment plant designed to serve a population of 30,000; three deep wells with a combined capacity of more than 3 mgd; and a water treatment plant for a population of 30,000. This program was essentially completed last fall. Since then extensions of sewers totalling 25,000 ft. and of water mains amounting to 35,000 ft. have been developed and will soon be under construction.

Financing of this needed project was based on a grant from the Housing & Home Finance Agency of \$557,000; a government loan of \$600,000; and city revenue certificates totalling \$750,000.

**Note by the Editor of Public Works:** Having been concerned greatly with the birth pains, so to speak, of many of these war time projects, including Warner Robins, that turned sleepy villages into minor metropolitan areas, wholly lacking initially in modern water and sewerage facilities, it is of great interest to see how these needs are being met now; late perhaps, but adequately. We congratulate Warner Robins.

● **TRUNK** sewers, some 30 inches in diameter, had to be built to carry the sewage to the sewage treatment plant.



● **LENGTH** of vitrified clay pipe is being lowered into trench by a front-end loader mounted on an Allis-Chalmers tractor.



# LITTLE CITY, BIG WATER SYSTEM and LOTS of SNOW



● SNOW makes water. Al Lowery and Art Bolenbaugh of Greeley Water Dep't.

## B. H. CRUCE,

City Manager,

Greeley, Colorado

A CITY of approximately 23,000 people, Greeley is situated about 30 miles from the foothills of the Rocky Mountains in northern Colorado. It is the county seat of Weld County and is surrounded by a highly diversified and wealthy agriculture interests.

Greeley has a most unique water supply system. It includes lakes, diversion ditches, direct diversion rights from a river and a contract with a water conservancy district. It also owns an irrigation company. In all, Greeley has an investment of over \$4 million in water facilities—plant, transmission and distribution lines, dams, reservoirs and ditches. It serves five other municipalities in addition to approximately 1,000 rural customers. Irrigation right holders have a demand, if the water is available, of 1,700 acre feet a year.

Greeley purchased the irrigation company and the system of lakes, diversion ditches and its decreed water rights in 1947. These lakes, scattered over a wide area high up in the Rocky Mountains, are 75 to 100 miles from Greeley. The diversion ditches transfer water from one river water shed to another and are 10,000 feet above sea level. The total cost to the city of these high mountain lakes was \$190,000.

Since the purchase of these lakes, the City has sold over \$90,000 worth of water for irrigation in addition to using a large quantity for municipal purposes. Little water, however, was available in 1954, the dryest year in Colorado in many years.

Each year the City sends men into the mountains prior to the spring thaw to work on the ditches, clearing them of snow pack which fell during the winter. The clearing of the snow pack is necessary in order to keep water from flowing over the ditch banks and washing out large areas. Also, if the water flows over the banks, it is lost to the City and is not available for municipal use or for the irrigation right holders.

It is essential to time this snow-clearing work properly. If it is done too soon, late storms and winds will refill the ditches with snow. If the work is postponed too long, the heavy spring thaws will wash out the snow packed ditches.

Since this water must be stored and reported to the river commissioner, it is measured by a Parshall Flume.

On April 4, 1955, two men with a bulldozer started clearing snow from the mountain road in order to reach the diversion ditches and bring in supplies for the work ahead. The higher up the mountain, the deeper the snow. At 10,000 feet above sea level, the average snow depth ranged from 3 to 4 feet; but snow drifts were found 8 to 10 feet deep in the roadways.

The dozer was able to clear only a few hundred feet each day, and by April 20th, the crew had cleared the road only for a distance of two miles, reaching an elevation of 10,270 feet. A cabin is located at this point and a second cabin is 3 miles further into the mountains. The snow drifts were so deep at the first cabin that it was decided to pack the necessary materials and supplies to the second cabin. When we get to the first cabin, we can

observe the condition of the snow; and, by having a crew alerted we can clear the ditches at the proper time.

Greeley keeps one man employed the year around to maintain a close watch on water flow into and out of its lakes and ditches. He must know the water shed of each lake and keep the flood gates open or closed as directed by the river commissioner. A flash flood can cause considerable damage to property; however, the supervisor of the lakes can protect the city's investment by watching storm clouds and knowing the water shed on which the rain is falling.

In 1954, Greeley's water consumption was 2,200 million gallons. Most of this amount came from direct diversion rights from the river; however, 1100 acre-feet came from lakes and 429 acre-feet from the conservancy district.

Direct diversion, by rights from the Cache La Poudre River, is approximately 8.1 million gallons per day. The contract with the conservancy district is for 15,000 acre-feet per year. The storage capacity of the mountain lake system is approximately 9,250 acre-feet. The peak daily consumption in 1954 was 14.7 million gallons.



● BULLDOZING the last 200 ft. in this kind of going required 3½ hours.



● **PLAY** units, such as this castle tower, must be on proper foundations.

Castle Tower, 12 ins. diameter, 10 ins. deep; Senior Castle Walk, 12 ins. diameter, 10 ins. deep; Horizontal Ladder, 24 ins. diameter, 37 ins. deep; All-Steel Slides, 14 ins. by 14 ins. by 24 ins. deep.

Adequate concrete footings and perfect alignment of all frame members are necessary to assure maximum structural strength and rigidity. But, actually, proper installation of playground equipment is not nearly so difficult as it might appear to be. For instance, we supply detailed but easy-to-read blue-

ground. After alignment, the fittings can be pulled down tightly, and the concrete allowed to harden.

Here is an occasionally overlooked point. No apparatus should be attached to the frames nor any playground unit be placed in use until the concrete footings have hardened thoroughly; 48 hours is the minimum time that should be allowed; much better is 72 hours.

With the installation prints as guides, playground equipment can be installed in a relatively short time. For instance, three men can install swing sets of the various standard sizes in four to six hours; combination units, in five to six hours; castle towers, three to six

# Proper Installation of Playground Devices

**RALPH WILLIAMS**

Treasurer, American Playground Device Co.

Anderson, Indiana

**AS IMPORTANT** as the selection of the right kind of playground equipment is the proper installation of the swings, slides and other devices. You may have purchased the finest, strongest, most durable and safest apparatus built, but you are in for much maintenance and replacement expense if you have not paid proper attention to installation details. If playground equipment is correctly installed, it is ready and able to withstand years of the most severe use and abuse. American recommends larger than standard concrete footings, and correspondingly supplies longer upright supports than usually furnished.

Swing sets, ranging from two to nine swings, require materials ranging from 2 bags of cement and 2/3 yard of sand and gravel mix, to 6 bags of cement and 2 yards of sand and gravel mix. The concrete mix should be three parts sand and gravel to one part cement.

Concrete footings for upright supports of swings should be 20 ins. by 20 ins. Sizes of concrete footings for upright members of other playground units should be as follows: Castle Towers—Senior, 12 ins. diameter and 10 ins. deep; Double

prints which show the ground plans and outline recommended procedures for installing each unit.

It's always a good idea to get the right start. Check your equipment carefully at time of delivery, and before you sign the carrier's receipt make certain that you have received all the bags, bundles, cartons, crates and pieces as detailed in the bill of lading. Much costly time may be lost if, with a crew assembled and already into your work of installation, you find that the carrier has lost in transit or failed to deliver all the parts you need to complete installation and assembly of each unit.

While part of your crew is beginning to assemble the units, others can stake off for the excavations according to ground plans. With the holes properly located and dug, the concrete mix can be poured. While the mix is still wet, the units—now assembled but with all fittings kept fairly loose—can be lifted into position and set down into the concrete.

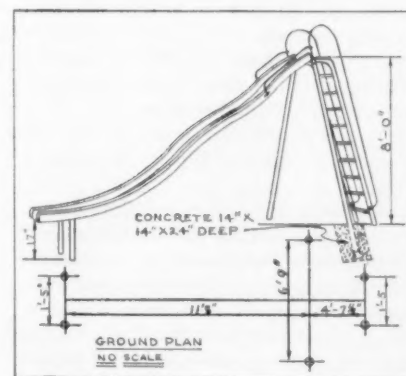
Alignment of all frame members is of paramount importance, both to assure the best appearance and maximum structural strength. So, while the concrete is still wet and the fittings still loose, a level should be used on all frame members to bring them into perfect alignment; and to make sure that top beams are level and straight, with the vertical supports perpendicular to the

hours; and slides, in three to six hours.

Concrete around the base of all frame support members should be troweled smooth and somewhat conically so that it is highest at the pipe members proper. It is recommended that at least four inches of turf cover all concrete footings, level with the ground line. This adds safety for the youngsters and protects the footing. For an extra measure of safety, the turf could be covered with tanbark, sawdust or shavings to cushion falls from apparatus. To assure maximum safety with castle towers, castle walks and other climbing structures, it is well to have six inches of turf covering the concrete footings.

Playground equipment should be installed with a definite, planned layout in mind. Children play best

(Continued on page 151)



● **METHOD** of installing playground slide to insure satisfactory service.



# SPECIAL TRUCK BODIES FOR WATER DEPARTMENTS

This concludes the data reported in our September issue on special truck bodies used advantageously by water departments throughout the country.

We have one ½-ton pick-up truck equipped with Powers American Service Body. The shelves and compartments on each side are handy for storing meters, parts, tools, corporation stops, leak finder, etc., and as they are stored in individual compartments, they are very easy to find. Carrying needed parts, etc. means less trips back to plant.—*Oscar Schulte*, Superintendent of Water, Tonawanda, N. Y.

We have a 2½-ton International truck with a 6-man cab, 14-ft. open bed, a 7-ton winch, also a Payne-Dean valve operator. Incidentally, we were the first Water Dept. in the U. S. to have our trucks equipped with radio, both meter and maintenance. I think we have one of the finest in the country today. We use it quite a bit when we work on the force mains as we pump 11 miles. We are now installing two more 1,000,000-gal. tanks to bolster our distribution systems.—*W. A. Meyers*, Superintendent, Distribution, Elyria, Ohio.

The City purchases the various size trucks without the body. The truck is then taken to a special body manufacturer, such as McCabe-Powers, St. Louis, and a body is installed according to our requirements depending upon the purpose for which the truck is to be used. The small pick-up or light service trucks are installed with bodies containing parts and tool compartments according to individual needs. The large repair truck bodies are designed in the same way, but include hydraulic winch, platform lift and compartments suitable for the purpose served.—*Harold W. Augenstein*, Superintendent of Water Works, Hamilton, Ohio.

We have one 1½-ton utility body truck with winch and derrick and sliding top. This truck is extremely handy in placing fire hydrants and heavy valves. It has compartments on each side which hold air tools, shovels, picks, barricades; and compartments for small tools such as caulking irons, runners, bolts, nuts, etc. In addition to the above we

have two ¾-ton trucks which are small editions of the above with the exception of the winch. We think so much of this type of truck that we are transferring the bodies to new chassis at this time.—*A. V. Agnew*, Superintendent of Water, Lorain, Ohio.

We have a 1949 Dodge ¾-ton truck with a Holan body which is especially designed for water maintenance. Also we have a 1947 Dodge



● FULLY - EQUIPPED utility truck used by the Hanover, Pennsylvania, municipal water works.

pick-up ½-ton capacity which is used for meter readings and repairs.—*Elmer G. Easterwood*, Superintendent, Pumping District, Maumee, Ohio.

We use two ½-ton pick-up trucks, one having a special body for utility purposes, containing bins and compartments for small hand tools, parts, log books, maps, etc. The next replacement will be ¾-ton with same type of body.—*J. Paul Hardesty*, Superintendent of Water, St. Clairsville, Ohio.

We have a White Truck with Garwood mounted crane which is used for pulling and installing fire hydrants, gate valves, etc.; also a #9 International ¾-ton truck with Payne-Dean automatic gate operator.—*A. W. Grathwal*, Superintendent, Water Distribution, Sandusky, Ohio.

For emergency service, meter leaks, customer service etc., we employ ½-ton trucks equipped with Morrison "Carryall" bodies and 2 way radios. Service trucks are 1½ to 2-ton with portable pump and air

compressor mounted as an integral part of this equipment.—*Stuart D. Whitford*, Chemical Engineer, Oklahoma City, Okla.

We use the series "E" body as manufactured by the Utility Body Company at Oakland, California. These bodies are mounted on ¾-ton trucks.—*Robert L. Lee*, Ass't. Superintendent of Water, Medford, Oregon.

Utility truck with winch is used for pulling old pipe out of ground as well as lifting and placing heavy pipe and fire hydrants; it also has a boom attached to winch for reaching out over trenches. The truck is equipped with bins.—*E. J. Masemer*, Manager Water Works, Hanover, Pa.

We use a Morrison body with compartments for our various needed tools.—*Kermit K. Kohr*, Superintendent, Lebanon, Pa.

Meter readers and service trucks use standard pick-up bodies. One construction crew uses a ¾-ton truck with Powers-American series 35W custom body. New 1-ton trucks are on order with Maryville custom body.—*M. L. West*, Director of Public Works, Kingsport, Tenn.

We build our own truck bodies for many of our trucks. Previously have made them of oak, but are making our first steel bodies this year. All service trucks and emergency repair trucks are equipped with 60 or 105 cfm compressors mounted behind the cab and have a complement of air tools, paving breakers, air shovels and tampers. Trucks have locked compartments for small repair items.—*K. Hoefle*, Superintendent, Dallas, Texas.

We use a standard ¾-ton truck with 6 compartments for tools; three compartments on each side.—*Sparta Water Commission*, Sparta, Wisc.

• • •

## DDT Dusted on Ice and Snow

A newly developed technique to apply DDT to hard-to-reach areas is used as part of the year-round mosquito control program reported by the Massachusetts Department of Public Health. In this operation, carried on during the winter, DDT powder is dusted onto ice and snow in swamp areas, where it remains until the spring thaw drops it into the water. This has proven to be a very valuable tool in areas where aerial spraying has been less effective than desired because of heavy brush. Wherever possible small areas which would normally be assigned to ground crews in the spring are also treated by winter dusting.

# APWA News

AMERICAN PUBLIC WORKS ASSOCIATION  
1313 EAST 60th STREET, CHICAGO 37, ILLINOIS

## Milwaukee Equipment Show Features Outstanding Exhibits

THE SIXTY-FIRST annual Public Works Congress and Equipment Show to be held in Milwaukee, Wisconsin, October 2-5, is expected to top all records. The action-packed program published in last month's issue will be balanced by an outstanding display of the newest equipment available to serve the public works industry. Sixty-nine of the Nation's leading manufacturers and suppliers will use over 40,000 square feet of space to exhibit a wide variety of products.

The following list of exhibitors will participate in the Milwaukee show:

Abrams Aerial Survey Corp.  
Aero Service Corp.  
Air Placement Equipment Co.  
Allis-Chalmers Mfg. Co.  
American City Magazine.  
Armco Drainage & Metal Products, Inc.  
Asplundh Chipper Company  
Austin-Western Company  
Badger Machine Company  
Badger Meter Mfg. Co.  
Barber-Greene Company  
Brooks Equip. & Mfg. Co., Inc.  
Bucyrus-Erie Company  
Calgon, Inc.  
Caterpillar Tractor Company  
Central Ohio Steel Products Co.  
City Tank Corporation  
Conveyor Company  
Dempster Brothers, Inc.  
M. H. Detrick Company  
Dotmar Industries, Inc.  
E. I. du Pont de Nemours & Co., Inc.

Elgin Corporation  
Engineering News-Record  
Flexible Inc.  
Flynn and Emrich  
Ford Motor Company  
Gar Wood Industries, Inc.  
General Electric Co.  
General Motors Corporation  
Gillette Publishing Co.  
Good Roads Machinery Corp.  
Gravely Tractors, Inc.  
Harnischfeger Corporation  
Harris-Barrier, Inc.  
Herman Body Company  
Heil Company  
Highway Equipment Company  
Frank G. Hough Co.  
Hydro-Power Street Sweeper Co.  
International Harvester Co.  
International Incinerators Inc.  
International Salt Co.  
Koppers Company, Inc.  
LeRoi Div., Westinghouse Air Brake Co.  
Line Material Company  
Massey-Harris-Ferguson Co.  
Maxwell Equipment Co.  
M-B Corporation  
K. E. McConaughay  
Mid-Western Industries, Inc.  
Morton Salt Company  
Morse Boulder Destructor Co.  
Nichols Engineering & Research Corp.  
O'Brien Mfg. Company  
Pak Mor Mfg. Company  
Pippin Construction Equip. Co.  
Pittsburgh-Des Moines Steel Co.  
Portland Cement Association  
Public Works Magazine  
Servicised Products, Inc.  
Sherman Products, Inc.  
W. H. Stewart, Inc.

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## Washington Organizes New Chapter

The Board of Directors of the American Public Works Association recently approved the proposed by-laws of the Washington (State) Chapter. This new Chapter was organized under the leadership of James Robertson, Assistant City Engineer of Seattle, Washington. Officials in attendance at a Public Works session of the past Annual Meeting of the Association of Washington Cities unanimously approved a proposal to form a State Chapter of the APWA. A proposed draft of by-laws to govern the new Chapter and petitions calling for its official recognition were circulated to the members in that State. Approximately seventy percent of the members signed the petition and endorsed the proposed by-laws.

Association President Warren A. Coolidge has appointed a Temporary



● MILWAUKEE Arena-Auditorium, site of the 1955 Public Works Congress.

Committee headed by Mr. Robertson to complete arrangements for the Inaugural Meeting of this new Chapter. Other members of the Committee are: Chester E. Murray, City Engineer, Wenatchel; John J. Sleavin, City Engineer, Aberdeen; Chester L. Waggoner, City Engineer, Pullman; and William L. Stancer, Pierce County Engineer, Tacoma.

### Grehan Heads New Orleans Chapter

At the Annual Meeting of the New Orleans Chapter, held recent-

ly at the Engineer's Club in the Desoto Hotel, a new slate of officers was elected for the 1955-56 term. President for the coming year is Robert H. Grehan, Roadway Engineer, New Orleans Public Service Co., Inc.; Vice-President is Kenneth M. King, Traffic Engineer. S. di Benedetto, Engineer, Sewerage and Water Board is Secretary-Treasurer and Clarence M. Palm, Senior Gas Engineer, New Orleans Public Service Co., Inc. and S. J. Stokes, District Engineer, The Shell Oil Company are Board-Members-at-Large.

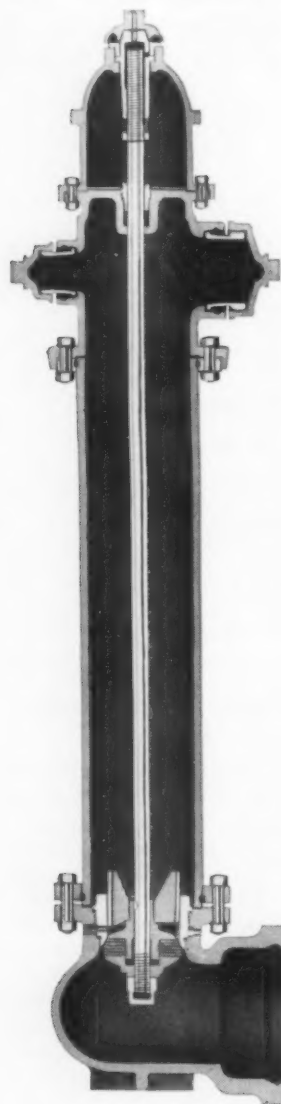
### Present Status of DDVP, the New Insecticide

Dimethyl 2,2-dichlorovinyl phosphate, a new insecticide developed by the laboratory staff of the Public Health Services Communicable Disease Center in Savannah, Ga., was announced by the Department of Health, Education and Welfare on February 1, 1955. Considerable publicity has followed the announcement of this potent insecticide, commonly known as DDVP, but little information has been given as to its availability. To provide the public with this information, the following data were published in the August issue of *Public Health Reports*:

DDVP is not now being produced commercially and it is not available for use by the general public. Before it can be released for general use, much investigation is needed to determine dosage requirements for specific insects, suitable formulations, and the toxicological hazards associated with its usage. Considerable time will be required to develop such information and to register labels with the United States Department of Agriculture as required by the Federal Insecticide, Fungicide and Rodenticide Act.

The Government has dedicated the discovery of DDVP to the public; and any manufacturer may engage in its production in the United States without obtaining a license from the Government. At the present time, only one manufacturer is known to have a pilot plant in operation. The limited quantities of DDVP being produced are available only to qualified research units for further study and field evaluation against a variety of insects. Until DDVP is produced commercially, estimates concerning its cost of production are impracticable.

What insects may be effectively controlled by DDVP cannot be predicted accurately. Because of its chemical properties and the present knowledge of its insecticidal activity and toxicity to warm-blooded animals, it appears that DDVP is apt to find only limited use against insects of public health significance. It has been shown to be effective on DDT-resistant houseflies as a surface spray and in poison baits, so it is expected that DDVP will be useful as an outdoor space spray to control adult flies and mosquitoes. There may also be some usage for it as a larvicide against flies and mosquitoes. However, because of its high volatility it is not likely to be useful as a residual spray; and because of its toxicity it appears unsuitable for use in vaporizers in occupied buildings.



**To meet every requirement  
you can depend on**

### the MATHEWS Flange Barrel Hydrant

For maximum reliability at lowest cost, you can't buy better than the Mathews Flange Barrel Hydrant. It has all the features that you look for in a top-quality hydrant — internal parts removable through the barrel, compression-type valve to prevent leaking in case of damage, completely revolving head. In addition, every friction point is protected by at least one bronze surface, and all water-carrying areas are designed to reduce friction and loss of pressure.

### And at slight extra cost...

**The Breakable Flange and Stem Coupling**—A specially designed flange in the standpipe just above ground level and a frangible coupling in the hydrant stem are both designed to snap when struck a blow heavy enough to break the hydrant. Both can be replaced quickly and inexpensively without excavation, while the rest of the hydrant remains undamaged.



## MATHEWS HYDRANTS

Made by R. D. Wood Company  
Public Ledger Building, Independence Square  
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Manufacturers of "Sand-Spun" Pipe (centrifugally cast in sand molds) and R. D. Wood Gate Valves

- Send for this 80-page catalog. It contains full information about the R. D. Wood line of
- Cast Iron Pipe, Fire Hydrants, Gate Valves, and Hydraulic Machinery.



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**Q.** Exactly what do you mean when you say this new Wolverine carton has "reel" value?

**A.** Simply this. By tying-in or holding the tube at one end and rolling the carton back—it acts as a reel—lets the tubing come from the roll in a straight, kink-free line.

**Q.** That makes sense. Can it help me in any other way when I'm on an installation job?

**A.** You bet it can. Because it's round, this carton can be rolled—just like a hoop. It really cuts handling time. There's a convenient center hole for easy over-the-arm or shoulder carrying.

**Q.** You say this carton isn't destroyed by opening. How come?

**A.** To open the carton all that is necessary is a pull on a gummed tape which encircles the outer rim. The carton is then open with the tube ready to use. Unused tube remains in the carton—protected against damage and dirt.

**Q.** Supposing I have two or three different sizes or types of tube in my truck. Do I have to open them all to get the one I want?

**A.** No sir! Reversed nomenclature makes content identification easy from any angle. The carton also carries approved color coding.

**Q.** Do different types of tube come in this new round carton?

**A.** They sure do. Just name the type you need. There's Wolverine copper water tube, copper refrigeration tube and copper automotive tube. And there's one thing for sure. In each case, it's the same high quality Wolverine tube you have come to depend on—always clean and dry and easy to bend.

**Q.** It sounds terrific. Where can I buy this new carton?

**A.** Wolverine tube is available through wholesalers only. Next time you visit your wholesaler insist on Wolverine's *flat roll of tube that rolls*.

WOLVERINE TUBE, 1427 Central Avenue,  
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**G-A ELECTRIC CHECK VALVE**

**G-A SURGE RELIEF VALVE**

Washington



news

Presented in cooperation with the American Public Works Association  
and through the courtesy of the  
Washington Office of the American Municipal Association.

**Public Works Advance Planning Included in Housing Bill**—The housing legislation adopted by the Congress immediately before adjournment authorizes the Housing and Home Finance Administrator to build up over the next four years a \$48 million revolving fund for interest-free loans to municipalities and other public agencies to aid in financing the cost of engineering and architectural surveys, designs, plans, working drawings, specifications, etc., for the construction of public works. These loans are to be repaid when the construction of the public works is undertaken or started. However, only \$3.5 million was actually appropriated for the first year even though \$10 million was authorized in this bill.

**Commerce Department Issues Plans for Administering New Airport Law**—To enable States and communities to begin the immediate development of revised airport programs, plans of the Department of Commerce for the administration of the new Federal airport law approved by the President on August 3 have been announced. This law authorizes \$42.5 million for Federal participation in airport construction in the current fiscal year, in addition to the \$20 million previously appropriated for this purpose. The law further authorizes a level of \$63 million for federal grants for each of the next three fiscal years.

The Secretary stated that allocations to individual airports have been virtually completed for the \$20 million originally appropriated. To avoid delay in the use of these funds, these allocations will be announced shortly. The programming of the additional \$42.5 million authorized for this present fiscal year will be deferred for a 90-day period to give sponsors an opportunity to submit new or amended applications.

A thorough review of the present programming and priority standards

will be undertaken immediately in order to determine the most equitable basis for administering the increased program. These new policies and procedures will be developed in consultation with interested groups, and will be announced soon.

The new law, which is administered by the Department's Civil Aeronautics Administration, will enable sponsors to present long-range airport plans based upon thorough studies of existing and future needs. "The new law will permit earlier programming of each fiscal year's authorization," the Secretary said, "and in some cases entire projects can be programmed with assurance that stated amounts of federal funds will be available in succeeding years."

**Technical Training for Municipal Employees**—A series of training programs to be operated from the Public Health Service's Sanitary Engineering Center in Cincinnati has been announced by the Department of Health, Education and Welfare.

The technical courses are designed for professional personnel from municipal health departments, water departments and air pollution control agencies. Additional short courses can be developed in response to specific needs. Recent research developments and current best practices are incorporated into all courses. Arrangements can be made to conduct training programs on your own home grounds in conjunction with regional groupings of municipalities or with state leagues and associations. Lectures, discussions, demonstrations, laboratory practice, problems and panel discussions are employed. No tuition is charged and municipal employees are eligible if their work coincides with the Public Health Service programs. Some of the training courses which will be given at Cincinnati this year include: (1) November 8—Individual Household Sewage

## BLAW-KNOX ROAD WIDENER *Spreads 500 tons per day!*

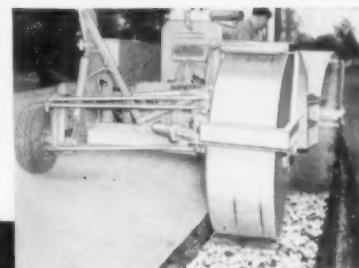
This job really rolled for D. E. Smith, Inc. of Mifflin, Pa. Their contract called for widening 3/4th of the stretch from 18' to 22', and the balance from 20' to 24', spreading 2" of fines in the bottom of a 3-ft. wide trench and, after compaction, spreading 10" of No. 4 crushed stone on top of the fines. *The Blaw-Knox Model 95 Road Widener, spreading 500 tons per day, widened approximately 3200' of highway every 10 hours!*

In addition to speeding operations, Blaw-Knox Road Wideners also lay concrete without forms, handle asphaltic concrete, dirt, gravel, stone or any kind of aggregate. They handle any widening job from 2' to 10' widths. They have many other time and money saving features your Blaw-Knox distributor will gladly explain. Call him today.



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Here's the most flexible and economical trench roller on the market! Width range can be accurately adjusted from a minimum of 20" to a maximum of 39", or any intermediate width. The two full-width, 60" high rolls, used either "dogleg" or tracking each other, are the equivalent of two separate rollers.

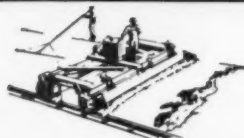


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"Complete Package"  
of CONCRETE PAVING  
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**ROTATES FROM LEFT HAND TO  
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IN 15 SECONDS**



The Roll-Over is a high speed, high capacity plow designed for use on airports, dual highways or open areas to move snow either to the right or left as wind direction and terrain may require.

This unique plow, made only by Frink, can be hydraulically reversed to deliver snow to either side by rotating the moldboard, thus it has the advantage of being able to discharge to the left and yet travel with the flow of traffic.

The Frink Roll-Over Sno-Plow combines all the desirable one-way features of good visibility, high speed, throwing and spreading ability with the versatility of a reversible plow.

By slight modification to the Frink lifting device assembly this plow may be used interchangeably on suitable sized trucks equipped for the Frink V-Type, One-Way Type or Reversible Blade Type Sno-Plows.



For further information on this Sno-Plow write for catalog to Clayton, N. Y., Box PW5510

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Disposal Systems; (2) November 14-18—Problems of Radioactivity in Waterworks; (3) March 5-16, 1956—Advanced Training in Water Pollution Abatement Programs; (4) March 20-21, 1956—Conference on Organization and Administration of Local Air Pollution Control Programs. In addition PHS offers extensive training in Civil Defense for public health employees, waterworks personnel and other municipal workers. Further information and application forms can be obtained from: H. P. Kramer, Chief of Training, U. S. Department of

Health, Education, and Welfare, Public Health Service, Sanitary Engineering Center, Cincinnati, Ohio.

**Steady Increase in Sewage Treatment Plants**—The first quarter of 1955 saw local governments in the U. S. letting 169 construction contracts for the construction or expansion of sewage treatment plants. The contracts totaled \$59 million and covered 72 new plants and 97 additions, enlargements or improvements to existing plants. Of the 72 new plants, which had a total cost of \$24.3 million, only four were in towns of more than 25,000 popu-

lation. The figures reveal that community financial resources are being strained, particularly in the smaller towns. The sewage treatment plant building boom centers in the North Atlantic and Upper Mississippi drainage basin states. Among individual states, however, California led the nation with 19 new contracts. In releasing the report of the Public Health Service, Surgeon General Leonard Scheele said: "The rising trend of sewage treatment plant construction is an encouraging indication that . . . more communities are becoming aware of the importance of pollution abatement for protecting public health and protecting our water resources."

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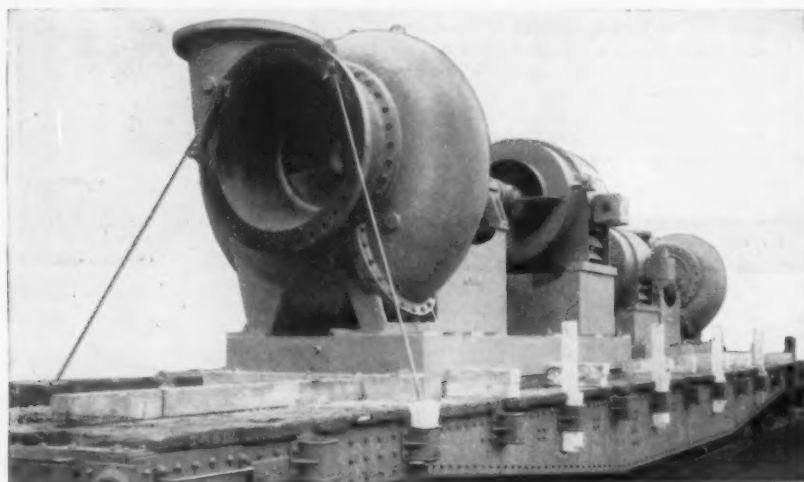
### Solving Shoulder Maintenance Problems

W. E. DICKINSON,  
Highway Engineer,  
Calcium Chloride Institute

**A** FEW years ago a turf or earth shoulder was sufficient on rural primary highways. Modern requirements for heavily traveled roads demand that a road shoulder remain level with the pavement edge for greater safety; support occasional traffic; provide an emergency parking strip; be relatively low in cost; and be easy to maintain.

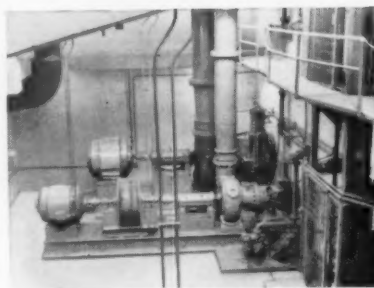
Last year Virginia completed several projects involving stabilized aggregate shoulders, using calcium chloride. Among these were two sections of US 301 from the Chesapeake Bay Bridge south for 12 miles. A shoulder 9 ft. wide and 3 ins. thick was constructed with pit-run sand-clay gravel. After shaping and compaction, calcium chloride was applied at the rate of 1½ pounds per square yard. On another section, 20 miles of shoulders were similarly stabilized using a local sand clay material. Both sections have performed exceedingly well. Blade maintenance requirements on the shoulders has been negligible.

Pennsylvania has had an extensive shoulder stabilization program, constructing approximately 400 miles of stabilized shoulders last year. Calcium chloride was used for stabilization during construction on part of this mileage; on the balance, calcium chloride was applied to the completed shoulder surface to keep it compact, smooth and dustfree. In Michigan, an ingenious maintenance technique was developed. A special shoulder maintainer



## THESE WHEELER-ECONOMY PUMPS HOLD CONSTANT LEVELS IN THE NEW TRICKLING FILTERS AT DALLAS' WHITE ROCK PLANT

Two of the Wheeler-Economy pumps installed in the White Rock Sewage Treatment Plant for Dallas, Texas are believed to be the largest ever operated through magnetic couplings. In order to maintain constant levels in the suction wells and grit channels, each of the two units driven through magnetic couplings are governed by an elaborate float level control. This helps the big Wheeler-Economy pumps to maintain level within predetermined 6" limitations. Total pumping capacity of the four Wheeler-Economy pumps installed at the White Rock Plant is 134 million gallons a day. Rely on Wheeler-Economy for help in complex pumping problems,



WHEELER-ECONOMY HORIZONTAL, MIXED FLOW RAW SEWAGE PUMPS AT INSTALLATION dependable delivery and performance that lives up to promise.

### Wheeler-Economy Pumps in Operation at Dallas' White Rock Plant

- 24" suction x 24" discharge variable speed pump driven through magnetic coupling by a 250 HP, 2300 volt horizontal electric motor. Capacity 20,000 gallons per minute at 40' total dynamic head.
- 24" x 20" variable speed pump, driven through magnetic coupling by 200 HP, 2300

- volt motor. Capacity 13,000 GPM at 40' TDH.
- 42" x 36" constant speed pump, driven by 400 HP, 2300 volt motor. Capacity 40,000 GPM at 37' TDH.
- 24" x 20" constant speed pump, driven by 200 HP, 2300 volt motor. Capacity 20,000 GPM at 37' TDH.

WE525

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OKLAHOMA CITY 2, OKLAHOMA



## In Dallas ... 3 machines bury refuse at 5 widely-separated landfill dumps

Two 7-yard D Tournapulls and a Tournatractor, handling refuse disposal in all parts of the city, have proved invaluable to the Dallas (Texas) city management.

"These rubber-tired machines never have to wait for trailer transport," says Operator L. F. Keeler. "They get around to our 5 garbage-disposal areas fast under their own power."

Although the 5 sites are located as much as 15 miles apart in the city's outskirts, the 28 mph Tournapulls and 19 mph Tournatractor quickly drive job-to-job over city streets, often through heavy traffic.

### Cover refuse delivered by over 145 trucks

At each dump, units excavate pits and stockpile material for cover. They also doze and compact refuse, blanket each day's collection of

rubbish with earth, and grade and compact the final 2-ft. cover of topsoil. Daily cover eliminates unpleasant odors, fly and ratbreeding, and other nuisances of an open dump.

*Superintendent of Sanitation G. C. Brinkley says: "I couldn't get along without these 3 LeTourneau-Westinghouse rigs. It would take 6 track-type tractors to replace them."*

### Less than 1/3 maintenance costs

Officials estimate maintenance of the rubber-tired equipment costs less than 1/3 as much as maintenance of track-mounted equipment.

Operator C. B. Wilson, who has run Dallas' first Tournapull since its purchase in 1951, says, "In all the time we've had this rig, it has needed only a few minor repairs! Its engine has needed no repairs. It costs little to run. And, it's easy to operate, too!"

All 3 units are still using original tires, which city officials say are in good condition.

Consider what faster job-to-job moves, plus less time for repair and maintenance, can mean on your landfill work. Get all the facts. Write or call us anytime!

Tournapull, Tournatractor—Trademark Reg. U.S. Pat. Off. DPT-810-P-2

**LeTourneau-  
WESTINGHOUSE  
Company**

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

is used. This is a light patrol grader with a short cutting blade, a strike-off blade with an edger, and a tow-type six-wheel rubber-tired roller. A pass with this unit restores the cross section, removes loose material from the pavement and compacts the reshaped material.

Recommended Maintenance Procedure for stabilized gravel shoulders consists of: Light blading to smooth the surface, restore the material flush with the pavement slab and maintain the proper slope or crown ( $\frac{3}{4}$ " per foot minimum); rolling the shoulders with rubber-tired or smooth wheel rollers to secure a compact surface; and applying a surface treatment of calcium chloride to maintain the surface moist and dustless and aid in the compaction.

Newly-constructed shoulders may require more than routine maintenance the first year to correct for uneven settlement and shrinkage and to restore to designed cross-section. Stabilized gravel of one-inch maximum size, with 10 to 20 percent passing the #200 sieve, should be available for sections requiring additional material to restore the original cross-section and also as surfacing over any oversize stones in the surface. Detail procedure is as follows: 1) Where necessary, add new stabilized surfacing aggregate to bring the shoulder flush with the pavement edge and provide proper slope. 2) Using a patrol grader or underbody truck blade, apply very light blading from the outside edge of the shoulder to the edge of the pavement. Such light blading should smooth the shoulder surface but not dislodge the coarse aggregate. A strike-off blade should be set up to remove aggregate from the pavement. Care should be taken not to cause a "cut" at the outside of the shoulder that may intercept surface water; and any sod picked up in blading operation should be removed. After blading, the shoulder should be smooth, with a slope of  $\frac{3}{4}$ " to 1" per foot to permit surface water run-off, and to prevent scooping off shoulder material by snow plows. 3) Following the blading operation, the surface should be rolled with a rubber-tired roller (minimum weight 1,000 pounds per tire) or a smooth wheel roller (5 tons). The rolling should be from the outside to the pavement edge. 4) The shoulder should then be given a uniform surface treatment of calcium chloride (A.S.T.M. D-98), applied with an approved spreader (the tail-gate type is recommended) at the rate of 1 to 1½ pounds per



Pushed 50 ft. by the Tournatractor, D Tournapull excavates pit where garbage will be buried. Load time in this clay-shale: 40 seconds. Stockpiling excavated material to be used as cover for refuse, Tournapull completes a 600' cycle in 2½ minutes. Output per machine averages 21 loads (105 pay yds.) per 55-min. hr. Pits are usually dug 10 ft. deep.



square yard. This maintenance and treatment is best completed in early spring (May) when the shoulder gravel is moist. A second treatment of  $\frac{1}{2}$  to 1 pound of calcium chloride be made later in the summer (August). The rates of the calcium chloride applications vary with shoulder conditions and traffic.

## ECONOMICAL STREET MAINTENANCE

FRANK E. FORCE,

Associate Editor, Public Works,  
Formerly City Engineer, Kent, Ohio

WITH approximately 35 miles of streets to maintain the City of Kent, Ohio, is very limited in the amount of money it can spend for new street construction and street oiling and sealing each year. There are approximately 18 miles of hard-surfaced or main streets and 17 miles of dirt and oiled or secondary streets.

The hard-surfaced streets are brick, concrete, or bituminous concrete surface on a sub-base of 4 to 6 ins. of gravel or slacker stone. The maintenance cost of these streets are cinder, gravel, slag and portion of the cost of maintenance is on the secondary streets. These streets are cinder, gravel, slag and stone with some dirt. The thickness of these materials ranges from 2 to 6 ins. in depth.

We have a street oiling and sealing program that we try to carry out each year to keep these streets in the best possible shape. We spend about \$15,000 annually on this program. The largest portion of the cost of this is carried by the City, the abutting property owners paying a small percent of the cost. Each property owner pays according to the amount of foot frontage they own. The method we have in oiling and sealing these streets is as follows:

A Galion motor grader with a scarifier attached is used to break and loosen the surface of the street making it ready for blading and mixing. This process eliminates large chunks and cuts down aggregate segregation. The mixing and blading are done with the blade on the motor grader. Then, after the material has been thoroughly mixed and the roadway has been shaped to its proper width, grade and crown, an 8-ton Galion roller is used to compact the material. The



## How 1 machine does work of 2

**S**uppose your city maintains 1 or 2 landfill garbage dumps. A front-end loader at each dump might cover about 100 tons of garbage daily. Neither rig is kept busy full-time, but it isn't worth the trouble and expense to load them on trailers and haul them around to do other jobs.

Then you get a D Tournapull. Just one. On a typical day your high-speed, rubber-tired "D" completes a schedule like this:

**8:00 A.M.** Operator reports for work, climbs on Tournapull and drives off. No waiting for flatbed, no loading or blocking. 28 m.p.h. rig averages 10 to 15 m.p.h. through traffic.

**8:10 A.M.** Arrives at city garbage dump 2 miles from garage. "D" uses its dozer blade to level refuse and its 7-yd. Carryall-Scraper to load, haul, and spread sand cover. Instead of crawling, it runs at its tasks . . . cleans up entire No. 1 Dump by 10:45 A.M. Drives to next job.

**11:00 A.M.** Rig reaches second dump, 3 miles away, gets right to work dozing garbage.

**12:00 Noon.** Lunch hour.

**1:00 P.M.** Continues hauling and spreading fill. Digs trench for future garbage burial and stockpiles earth for cover material.

**2:35 P.M.** Tournapull finishes at Dump No. 2, is ready to return to Dump No. 1, or handle odd-job assignment. Foreman sends Tournapull to grade small city-owned parking lot downtown.

**2:50 P.M.** Arrives at site after 2-mile drive. Removes dirt from parking lot and dumps it in old excavation a block away. "D" moves 70 cu. yds. hourly on 1600' cycle . . . in 2 hours levels lot to hold 60 cars. Next time Tournapull has a few spare hours, it will be used to self-load, haul, and spread gravel surfacing on the lot.

**4:50 P.M.** Operator and rig take off for yard, drive a mile through rush-hour traffic in 5 minutes, are back at garage before 5 o'clock.

Impossible for 1 machine to do all this work in 8 hours? It happens every day in cities which own D Tournapulls. Dallas, Texas, for example, works 1 "D" at 5 widely-scattered garbage dumps.

But don't take just our word for it. Ask your LeTourneau-Westinghouse Distributor for job-proved facts and figures on how American cities are getting better service with D Tournapull. He also will be glad to show you this handy rig in action.

Carryall, Tournapull—Trademark Reg. U.S. Pat. Off. DP-343-P-zz-w



**LeTourneau-Westinghouse Company**

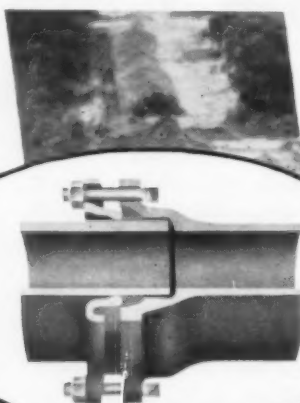
PEORIA, ILLINOIS

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amount of rolling depends upon the type of material being rolled and since there are no compaction tests taken, the engineer has the final decision on the amount of rolling.

A prime coat of medium curing asphalt MC-O is sprayed over the compacted roadway by a 1500-gal. distributor at a rate of 0.35 gal. per sq. yd. We use this type of asphalt because of its penetration quality. Then we spray, at the rate of 0.40 gal. per sq. yd., a seal coat of medium curing asphalt MC-5 on the prime coat. On this we spread a layer of #6 slag chips at a rate of

40 pounds per sq. yd. Then chips are spread by a spreader box that can be attached to our dump trucks. The 8-ton roller is used to compact the finished roadway thoroughly. We would rather use #6 crushed gravel because it is cheaper and seems to wear better than the slag, but it is not always available. We have been doing this type of paving for the last three years and find it works very satisfactorily on the secondary residential streets. Trucks could not use these streets for they are not built to take heavy traffic.



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Boltite is standardized mechanical joint pipe. Glands, gaskets, bolts and joint dimensions are standardized with all leading pipe makers, and are interchangeable for given sizes of pipe.

Boltite mechanical joint lays fast. Joints are quickly made by unskilled workmen. The only tool needed is a ratchet wrench. There is no lead pot. Joints may be made in a wet trench. The joints are flexible and stay flexible, allowing for expansion or contraction and settlement without leakage. The joint materials are as durable as the pipe itself—both last for centuries.

For details, write or wire McWANE CAST IRON PIPE COMPANY, Birmingham, Alabama, or PACIFIC STATES CAST IRON PIPE COMPANY, Provo, Utah. (Sales Offices in Principal Cities.)

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The cost of the oiling and sealing operation amounts to approximately \$1.00 per lineal foot per 24-ft. pavement. This cost may be broken down as follows. The materials, the asphalt and slag cost \$0.61. The labor, which includes the equipment, laborers etc., amounts to \$0.39. The City pays \$0.85 per lineal foot of the dollar and the abutting property owners pay \$0.15 per lineal foot.

We are capable of improving approximately 3 miles of streets each year by this method. We find with the amount of money available and the equipment and laborers on hand, that we are giving the tax payers of Kent the best type of street improvement for their money.

## BACTERIAL REDUCTIONS in the Chlorination of Sewage

A STUDY WAS initiated to determine a general chlorine dose level at which an adopted chlorination schedule should be maintained to produce an effluent of acceptable bacterial quality from the Laconia, N. H. sewage treatment plant. Along with the plant effluent study, a parallel study of very limited scope on the efficiency of chlorination was run on a laboratory scale. This was done to contrast results possible in the laboratory with those obtained at the plant. Some effort was also made in the laboratory to indicate the material difference, if any exists, between the bacterial quality of settled sewage which has been chlorinated prior to settling (an arbitrary 2-hour settling period was allowed) and that which has been chlorinated after settling with a contact period of 15 minutes. It appears that the capital costs of providing detention periods much in excess of 15 minutes are not often justified by the increased kills provided. Where higher kills are necessary during certain seasons, a seasonal increase in the chlorine dose is indicated rather than additional detention period.

The Laconia sewage treatment plant consists of bar screens, grit chambers, Parshall flume, comminutors, pumps, settling tanks, separate sludge digesters, and covered sludge drying beds. The influent to the pump wells is chlorinated with solution feed gas machines. The chlorinated sewage is then pumped to the settling tanks. Thus, chlorination of raw sewage followed by a variable combined detention and settling period of between 2 and 6

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Used in conjunction with chlorine from a conventional chlorinator, this high potency chlorine dioxide solution, plus any desirable excess of chlorine from the generating process, will solve your water treatment problems.

Moreover, this method saves time and trouble. It permits the introduction of the bactericidal solution right at the desired point of application. Unlike breakpoint or superchlorination, it requires little control or supervision. And it also eliminates the need for carbon and ammonia in the control of taste and odor in municipal waterworks operations.

This method may also be used to maintain a free residual in distribution systems... to effect iron and manganese elimination... and to control the offensive tastes and odors produced by phenols, algae and industrial wastes.

Mail the coupon for additional information about sodium chlorite's effectiveness and its many money-saving applications in municipal operations.



Technical grade sodium chlorite, recommended for municipal applications, is available as buff-colored, dry, hygroscopic flakes in 25-lb. pails, 100-lb. drums... and 8,000-gal. 50% solution tank-car lots.



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hours (design is for  $2\frac{1}{2}$  hours detention at 1.6 mgd) is provided. There are four pumps, each designed to operate at either of two speeds and delivery. Pump motor actuating switches (float controlled) are scheduled so that the pump discharge rate to the settling tanks will conform closely to the sewage flow rate to the plant. There appeared to be some surface drainage entering the sewerage system and considerable infiltration.

The work covered both winter and summer conditions. Samples for bacterial analysis were not taken on

Saturdays or Sundays. Members of the staff, under direction of Thomas LaCava, Chief Water Pollution Engineer, include R. A. Eckloff, Associate Engineer; John V. Richards, Senior Sanitary Engineer; George E. Balch, Chemist; Terrence P. Frost, Water Pollution Biologist; and Kenneth J. MacDonald, Technician. Results were reported to William A. Healy, Technical Secretary, N. H. Water Pollution Commission. The report states, in part:

The primary purpose of this study was to determine the general dose level at which an adopted chlorina-

tion schedule should be maintained to produce an effluent of acceptable bacterial quality from the Laconia Sewage Treatment Plant. This purpose, we believe, has been achieved and accordingly, it is recommended that:

(1) The daily minimum chlorine dose should never be allowed to drop below 14 ppm. To achieve this, the plant operator can select a number of night-and-day chlorine dose schedules which will produce equally effective results. Experience will indicate which combination possible would require the least chlorine.

(2) The combined chlorine residual (O.T. method) of the settling tank effluent never be allowed to drop below 1.0 ppm.

(3) Both chlorinators be completely separated at the chlorine cylinder end of the works. This would mean another scale, manifold, some valves and piping, and could be accomplished for perhaps no more than \$1,000. This additional equipment would serve to reduce hazard to the operator while changing cylinders and cylinders could be replaced without interruption of chlorine feed. At present, the operators at the plant shut off the chlorine feed completely when replacing cylinders, thus interrupting disinfection from 20 to 30 minutes.

The above recommendations, if followed, should produce acceptable treatment plant effluent better than 95 percent of the time provided that the character of Laconia sewage does not materially vary from the sewage studied.

It is believed that very material savings in chlorine may be achieved, with the added advantage of simplicity of control, by proportioning chlorine dose to sewage flow. If this method of dose control were adopted instead of the fixed feed schedule rates, it appears that results approaching those attainable in the laboratory would be possible. This represents something in the vicinity of a 50 percent saving in chlorine. Anywhere from \$1500 to \$1800 per year may be saved in chlorine alone besides having better control of effluent quality. It is our opinion that normal variation in the strength of sewage will have no practical effect on the results even though proportioning is in relation to sewage flow only. It is suggested that the City of Laconia install chlorine dose-proportioning equipment for economy. Cost of such equipment in place (for one unit only) should not exceed approximately the sum of \$1500.

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Not only is Triangle Brand Copper Sulphate successful in controlling algae but it also is effective in killing some aquatic weeds. Since the weeds are submerged and disintegrated, there is no chance of them floating down stream to start new infestations, or to clog the waterway.

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## PUBLIC WORKS DIGESTS

# The SEWERAGE AND REFUSE Digest



## Re-Use of Sewage Plant Effluent by Industry

Effluent from a properly operated secondary treatment plant may be superior, for many applications, to surface supplies available in the same area. Wider application of such use may depend chiefly on a realization by industrial managers and plant engineers of its inherent advantages and evaluation of the economic and technical factors. The greatest demand for water by industry is for cooling water of all kinds. In many cases, the volume of re-usable water available from a sewage plant is greater than the potential demand from the industry. Where the sewage plant effluent can be used without further treatment, no further equipment costs are involved; even where preparation for industrial use by softening, pH correction, etc. is necessary to permit of process applications, a similar treatment of alternate supplies of water may be necessary at equal cost. Such treatment may be necessary to correct high color, nitrogenous content, BOD, dissolved solids or presence of phosphates. The author describes two plants installed to prepare sewage effluents for use by refineries, giving a saving, in one case, of \$10,000 to \$15,000 a year.

"Treatment of Sewage Plant Effluent for Industrial Re-Use." By R. J. Keating and V. J. Calise, Graver Water Conditioning Co. *Sewage and Industrial Wastes*, July.

## High-Rate Activated Sludge Treatment

Experiments conducted for the National Health Research Council show that, using high-rate activated sludge treatment (70 to 80% BOD removal), it is possible to obtain as good an effluent as in the normal process, provided the supply of oxygen is sufficient; the rate of biochemical oxidation itself is very high. Therefore, increasing both the oxygenation capacity and the load

by 10 or 20-fold does not reduce the efficiency of the process; the oxygen supply and not the temperature regulates the rate of the process.

"Rate of Biochemical Oxidation." By A. Pasveer, National Health Research Council, Netherlands. *Sewage and Industrial Wastes*, July.

## Measuring Depth Of Flow in Manholes

To determine from time to time the varying volume of flow in a given sewer, the author first determines the relation between flow and depth of sewage in a manhole on the line of the sewer, plotting a curve for interpolating for any depth of sewage; then, at any future time, he determines the flow by measuring the depth in this manhole. For conveniently doing this, he uses an "ohmmeter depth gage." This consists of two aluminum tubes or rods connected to an ohmmeter; one tube rests on the bottom of the sewer, the other is raised from the bottom until it rises above the surface of the sewage. The exact point at which it leaves the surface is indicated by the motion of the ohmmeter needle, and its distance from the bottom is read on a gage attached to a stationary tube.

"Measuring Flow in Sewers by the Ohmmeter Technique." By John D. Eye, Ass't. Prof. of San. Eng., Va. Polytechnic Inst. *Water & Sewage Works*, July.

## Garbage Cooking In Iowa

An Iowa law which requires the cooking of garbage fed to animals became effective in June, 1953. A survey was made recently by Iowa State College to learn conditions resulting from this law. It was learned that the number of garbage feeders had fallen from over 400 to 60, but then began increasing and reached 73 on Jan. 1, 1955. All operators interviewed reported that they have gained under the new regulations,

the death losses were lower, and the hogs prefer cooked garbage to raw and eat a much larger percentage of it. Most of the cookers are homemade, with low fuel efficiency.

"Garbage Cooking in Iowa." By E. Robert Baumann and M. T. Skodje. *PUBLIC WORKS*, August.

## Activated Sludge Treatment at Low Cost

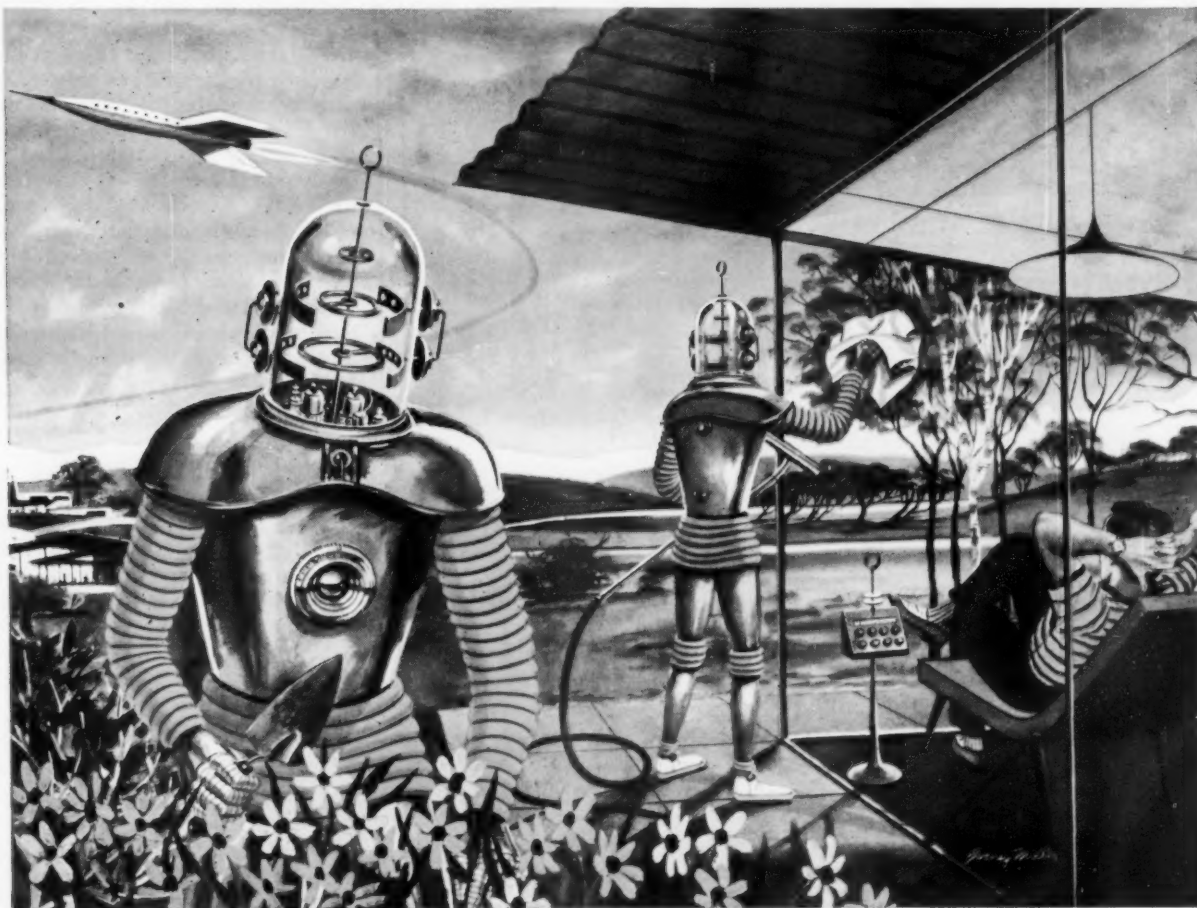
Cleveland, Tenn. has recently completed an activated sludge plant for treating 2-5 mgd which has some unusual features. One is that the cost was only \$18 per capita for a design population of 25,000. The area occupied by the units themselves including drying beds, but not the land between, is less than 1.3 acres. The plant provides screening, chlorination, preaeration, grit removal, primary clarification, activated sludge treatment, sludge concentration and digestion, with gas utilization. Its chief unusual feature is the combination of aeration and final settling tanks in a single unit, permitting return of activated sludge without pumping. There are tanks for primary and secondary digestion, both tanks heated by a Selas heat exchanger. Plant effluent is used for clearing the various structures and watering the grass. The plant effects better than 97% purification. Operation cost, including labor, electricity and all supplies, has averaged about \$14 per mg of sewage treated.

"New Type Activated Sludge." By Martin A. Milling, Consulting Engr. *American City*, August.

## Mixing Contents Of Digester Tank

Topeka, Kans. is mixing the contents of a 100,000 cu. ft. digester by use of vertical hot water coils formerly used for heating it. There are six 1 1/4-in. pipes that extend from top to bottom of digester. Ten 1/4-in. holes were drilled at 2-in. vertical spacing in each pipe; starting 16





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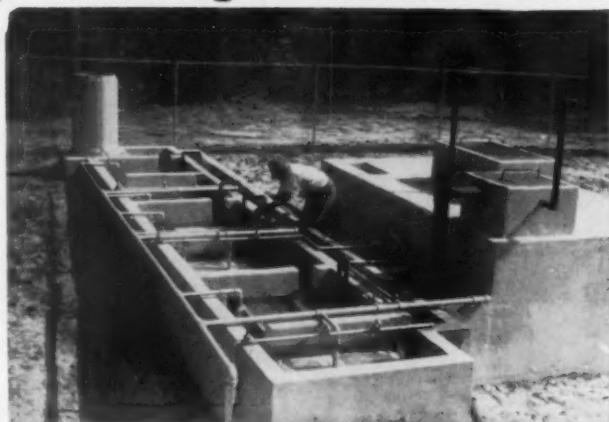
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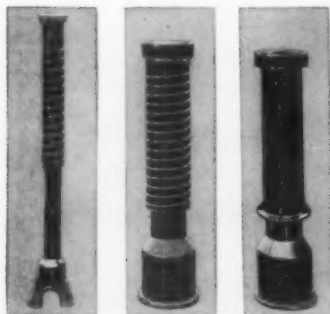
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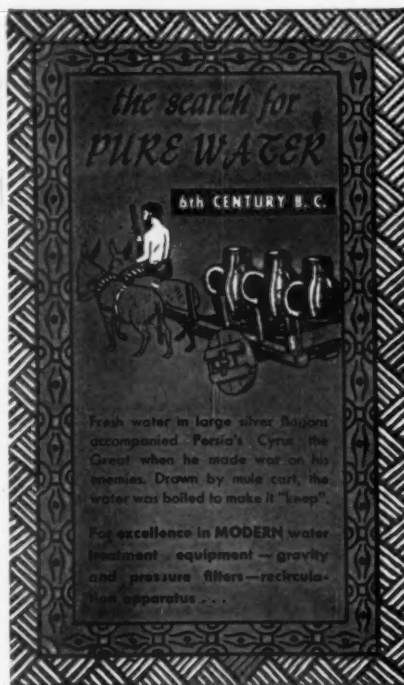


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ft. below the top of the digester and extending upward for 18 ins. Digester gas is blown through these pipes by means of a gas blower. Different schedules of blowing were tried, from 2 hrs. out of 8 to continuously. The latter caused too great a solids content of the supernatant. It was decided that somewhere between one-fourth and one-half time operation is needed for complete scum control.

"Heating and Mixing Sludge With Surplus Sludge Gas and Steam." By D. B. Kissinger, Engr.-Supt. Wastes Engineering, August.

### Controlling Aerator Frothing

The plant which treats the sewage of St. Joseph and Benton Harbor, Mich. contains three 478,000 gal. aeration tanks. As in many other plants, these foamed frequently, the froth rising as high as 8 ft. at night, but seldom more than 2 ft. during the day. This was thought to be due to the fact that the rate of flow at night is only 2 mgd, while it is 4.5 mgd during the day; and as the length of the detention period increases, so does the amount of aeration per gallon of mixed liquor. Every morning a workman spent from one to three hours with a hose cleaning the froth from the tanks and walks. In the spring of 1954 they began using a chemical called Hodag S88, a glycerin compound derived from petroleum and since then the froth has never risen more than 2 ft. high. The chemical is mixed with the effluent from a chlorine contact tank and sprayed onto the tanks. The chemical is used about 10 days of the month; the rest of the time a water spray suffices to control the foaming.

"How One Sewage Plant Eliminated Aeration Frothing." By Phil Hirsch. PUBLIC WORKS, September.

### Refuse Disposal At Milwaukee, Wisconsin

Between 1940 and 1950, the population of Milwaukee increased 8.5%, the garbage collected increased 34.3% and the ash and rubbish 30.5%. Formerly most combustible materials were buried or dumped; but dumping places became scarce, and the two old incinerators were not capable of burning all the refuse. In 1953 and 1954 two incinerators were constructed, one in a residential area, the other in an industrial one. The plants are of the bin and crane type, one with Nichols incinerators, 300 tons capacity; the

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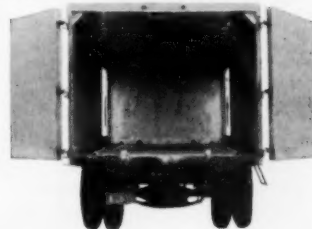
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other Pittsburgh-Des Moines incinerators of 300 tons capacity. Both are described in this article.

"Milwaukee's Refuse Disposal Plants." By George C. Ashton, Supt. PUBLIC WORKS, September.

### Waste Disposal at Air Force Stations

Practically all types and designs of treatment methods are used in disposing of wastes at the many air force installations. For secondary treatment, the majority of the plants use trickling filters; others use ac-

tivated sludge, contact aeration, Imhoff tanks, oxidation ponds, and septic tanks. By the latest reports, 78% of the air bases treat their sewage, 20% contract with nearby municipalities for treatment; only 2% discharge the wastes into streams untreated. The design criteria and the conditions wherein the problems differ from those of municipalities are described in detail by the authors; also conditions found in Greenland, Alaska and other arctic areas are described.

"Disposal of Wastes at Air Force Stations." By Major Ralph F.



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Thompson, San. Eng'r., Surgeon Generals Office, Lt. Joseph F. Lagnese, Robert A. Taft, San. Eng. Center, U.S.P.H.S., and Robert J. Hanson, San. Eng'r., U.S.A.F. PUBLIC WORKS, September.

### Feeding Cooked Garbage in California

Three of the larger hog raisers in Southern California, where garbage from most of the municipalities has for years been disposed of by feeding to hogs, ran a 7-month test of the effect of cooking the garbage. Of 500 hogs, 250 were fed cooked garbage and 250 raw. The conclusion was that feeding cooked garbage was both satisfactory and economically advantageous—the conclusion reached by tests made in Iowa. (See "Garbage Cooking in Iowa", in the August issue of PUBLIC WORKS). However, the author believes that feeding garbage to hogs is certain to decrease because of the decreasing prices being paid by disposal contractors and the higher cost of the separate collection system.

"Cooked Garbage Yields Dividends to Hog Feeders." By W. A. Schneider, Director of Sanitation, Los Angeles, Calif. *Civil Engineering*, August.

### Other Articles

"Arctic Sewer and Soil Temperatures." Efforts to solve the problem of sewer system freeze-ups at Fairbanks, Alaska. By William B. Page, U.S.P.H.S. *Water & Sewage Works*, July.

"Waste Treatment in Ontario Province," particularly phenols. By A. V. Delaporte, Ontario Dept. of Health. *Water & Sewage Works*, July.

"Sewer Service Charges at Charlotte, N.C." By Robert S. Phillips, Ass't. Supt. of Water Dept. *Sewage and Industrial Wastes*, July.

A meter for measuring thick sludge. "Accurate Control of Sludge." By Everett M. Jones, Simplex Valve & Meter Co. *American City*, August.

"Operation of Booster Pumping Stations." By LeRoy W. Van Kleeck. *Wastes Engineering*, August.

"Detachable Containers Keep Streets Clean and Cut Labor Costs" at Lubbock, Texas, where 22 Dempster-Dumpsters have reduced labor costs by \$11,445. a year. By Wm. B. Holmes, Dir. of Public Works. *Public Works*, September.

"Miami Modernizes Refuse Disposal Facilities." Uses 74 packer collection trucks, and a 900-ton Nichols incinerator plant. By Ernest A. Fort, Dir., Dept. of Public Service. *Public Works*, September.

"A Critical Appraisal of Sewage Works Operation and Design." Con-



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clusions from a study of the operation of 84 sewage treatment plants in the state of Washington. By Robert O. Sylvester, Assoc. Prof. of San. Eng., University of Washington. Sewage and Industrial Wastes, July.

"Studies of Biochemical Oxidation by Direct Methods: V-Effect of Various Seed Materials on Rates of Oxidation of Industrial Wastes and Organic Compounds." By I. Gellman and H. Heu-kelekian, Rutgers University. Sewage and Industrial Wastes, July.

"Sewage Chlorination in Review." By Werner N. Grune, Asst. Prof., Georgia Inst. of Technology. Water & Sewage Works, August.

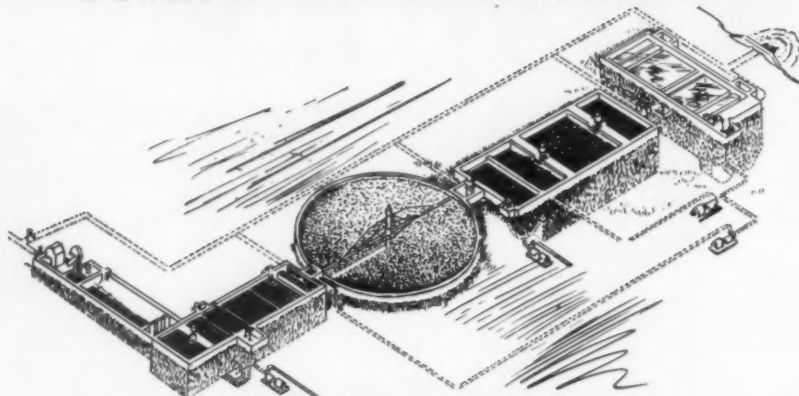
"Shoreline Pollution Before and After" the operation of San Francisco's treatment plant. By A. E. Bagot, Chemist, Dept. of Public Works. Water & Sewage Works, August.

"Determination of Anionic Syndets." A method suggested as a standard in Britain. By John Finch, Mgr. Sew. Disp. plant at Rotherham, England. Water & Sewage Works, August.

"Design of Minor Sanitary Sewers." By George W. Reid, Assoc. Prof. San. Eng., Univ. of Oklahoma. Water & Sewage Works, August.

"Characteristics of Sewage." By Don E. Bloodgood, Prof. San. Eng., Purdue Univ. Water & Sewage Works, August.

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## PUBLIC WORKS for October, 1955

### Insecticide Spray Program for Control of Flies after a Flood

Heavy rains caused flash floods that poured into the lowlands of Albuquerque, N. M. Cesspools, latrines, and basements were flooded and open pools of water worried city and state health department officials as well as the city commission. A heavy fly infestation was expected from the above condition. The city had a sprayer with hoses and guns but realized these could not begin to cover the flooded area in time to do any good.

The city authorized the emergency purchase of a Rotomist from the Edmunds Chemical Company and the unit was installed on a city garbage department truck. Two men operating the unit sprayed twenty-five blocks, both front and in the alley, in two hours in an area that was hit worst by the flood. Following this, the health department was besieged with calls requesting that flooded yards, chicken houses, cesspools, etc., be sprayed. Albuquerque City Health Department sanitation Inspector, W. H. McManus, directed the field operation. A 200-ft. hose and a 780 gun were used to spray the interiors of inundated houses, basements, and some inaccessible areas. It is hoped that the fly spraying will also help control cockroaches as a secondary result. For the fly control program 3 gallons of 57% malathion and 20 pounds of sugar were mixed with approximately 70 gallons of water.

• • •

### The Drought in Kansas

The current Kansas drought began in 1952 and has continued into 1955. During this period, 62 cities have provided emergency water supplies at a total cost of \$4,300,000. Farmers spent an additional \$7,400,000 to haul water during the first 10 months of 1954. Of the 420 municipal supplies in Kansas, 175 have been short of water and 169 restricted water use by rationing. Most of the distress occurred in eastern Kansas where ground water is scarce and many cities depend upon surface sources. During this period, competition for water has been keen, with some conflicts occurring between cities and farmers and upstream irrigation has threatened several city water supplies. These data are from a paper before the ASCE by Dwight F. Metzler, chief engineer of the Kansas State Board of Health.



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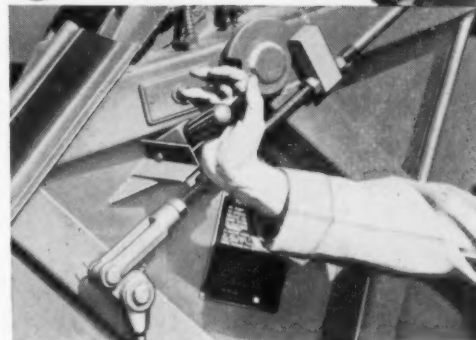
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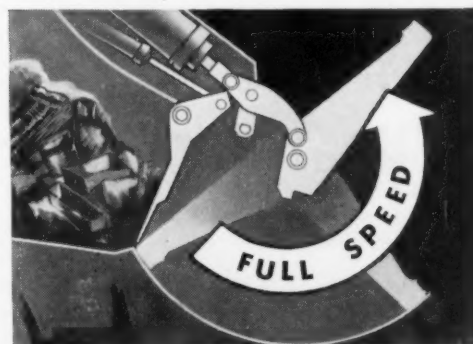


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## PUBLIC WORKS DIGESTS

# The WATER WORKS Digest



## The Coliform Index And Enteric Virus Pollution

Is water free from bacterial pollution as measured by the coliform index also free from virus pollution? To answer this, and other questions relative to the presence of viruses in water and in effluents from purification units, the authors conducted laboratory experiments from which they concluded that the coliform index is, in general, a valid measure of pollution, both bacterial and viral, and is a reliable indication of the efficiency of treatment processes in removing enteric viruses; also that complete treatment of water is necessary to insure safety from pollution by viruses. It is possible that, even though enteric pathogenic viruses are not completely destroyed by treatment, they may be so reduced in strength and number as not to be infective to consumers.

"Relation of Coliform-Organism Test to Enteric-Virus Pollution." By F. Wellington Gilcreas and Sally M. Kelly, New York State Dept. of Health. *Jour., AWW Ass'n*, July.

## Effects of Detergents On Treatment of Water

A task group of the AWWA has reported on the effects of detergents in the water treated, including foam on settling basins, tastes and odors, coagulation and sedimentation difficulties, iron removal difficulties, foaming of finished water, and quality deterioration in the distribution system. Several cities had trouble making floc settle, and iron and manganese were held in a peptized state by the detergent. Some cities found that use of alum with activated silica was helpful in coagulation, and chlorine dioxide in reducing tastes and odors. Activated carbon is effective in removing detergents, but only when tremendous quantities are used. Inert materials, such as finely divided ground silicon

dioxide, are completely ineffective; but precipitated calcium carbonate is quite effective. Partially settled sediment from the sedimentation basins is very effective in removing detergents; the saturation point of re-cycled sediment is being determined. It seems probable that the removal of detergents is a surface adsorption phenomenon.

"Effects of Detergents on Water Treatment." *PUBLIC WORKS*, September.

## Radioactivity Studies in Massachusetts

The Lawrence Experiment Station, Mass. Dept. of Public Health, has been interested in radioactivity of water for many years, having issued a report on the subject in 1916. Since the 1953 detonations in Nevada it has measured the fall-out in rivers and reservoirs after each detonation; also the radioactivity of effluents from the Lawrence filtration plant. Data on these observations are given in the article. It is stated that filtration through a sand filter gave substantial reduction in radioactivity, chiefly by adsorption, possibly by electrolytic means. The remainder is carried down in the sludge, which must be disposed of suitably.

"Radiation Experiences in Massachusetts Water Supplies." By Ralph M. Soule, Mass. Dept. of Public Works. *Jour., New England WW Ass'n*, June.

## Chemical Reactions In Water Softening

Hot and cold softeners are chemical reaction units which treat water with chemicals at various temperatures to reduce dissolved and suspended impurities. In simple chemical precipitation reactions involved in lime or soda ash softening at cold water or room temperatures, the presence of substantial amounts of solid precipitates or seed, such as

CaCO<sub>3</sub> flour, substantially speeds up the process. At higher temperatures, the presence of seed influences the speed of the reactions less and less until, at temperatures above 212° F, little or no effect is had on the velocity of chemical softening reactions. At room or cold water temperatures, silica removal by contact with suspended solid magnesium compounds is a sluggish reaction, even when magnesium is precipitated *in situ*. At elevated temperatures, silica removal is most rapidly and economically effected by contact with large concentrations of accumulated magnesium compounds. At room temperatures, the sulfate anion SO<sub>4</sub> seems to have the greatest effect in slowing the rate of reaction and formation of calcium carbonate; the chloride anion Cl has less effect. The most rapid reaction is the simple one of lime. The presence of sludge or solid CaCO<sub>3</sub> at room temperatures permits reactions to take place at high speed, regardless of the anion type, with a given excess of chemical softening reagent.

"Chemical Reactions in Hot and Cold Treatment Units." By V. J. Calise, J. Duff and R. Dvorin, Graver Water Conditioning Co. *Jour., AWW Ass'n*, July.

## Rehabilitation of Wells by Chlorination

Chlorine treatment of wells is effective in eliminating bacterial growths in strainers and the areas immediately adjacent to them, and in pump bowls and pipes. The chlorine should preferably be applied at the bottom of the well, allowed to stand for 12 to 24 hours, the well possibly being surged occasionally. Or enough may be applied to the top of the well to give 50 to 100 ppm and the well back-flushed after soaking. The amount of chlorine should not be sufficient to lower the pH of the water in the well below 4.0 or the screens may be

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damaged. Chlorine will not remedy trouble caused by dissolved salts or iron hydroxide or carbonate.

"Well Rehabilitation by Chlorination." By A. E. Griffin, Wallace & Tiernan Co. *Water & Sewage Works*, July.

#### Advantages of Ground Water Supplies

Ground water may be used as a source of supply, even when surface supplies are available or already in use, to supplement these temporarily until additional surface supplies can be developed, or on

outlying sections of an inadequate distribution system. Where the surface supply is contaminated, inadequate at intervals, too warm, or high in mineral content, a ground water may be available which is free of these objections. In deciding whether to use a ground water supply and in selecting a site for wells, an experienced and reliable engineer should be employed. The author describes at length the possibilities of various geological formations, the use of test wells, the selection of size, material, etc. of wells, sampling the water, selection of pump

testing capacity, use of underground storage, etc.

"Ground Water Can Alleviate Water Shortages." By Kenneth E. Moehrl, Layne & Bowler, Inc. *PUBLIC WORKS*, September.

#### Dip Method of Cleaning Meters

Hamtramck, Mich., cleans its water meters by dipping them in three liquids in succession, which cleans, descales and brightens them. After the meter has been completely disassembled, the parts are placed in a wire basket and dipped in a commercial solvent called Kelite Formula 555 to dissolve gummy, oily or greasy accumulations. They are then rinsed in hot water and dipped in a solution known as scale<sup>4</sup> off to dissolve rust and mineral scale deposits. This leaves a tarnish which is removed by dipping in Metal-Brite. Rinsing in hot water completes the process.

"Three Dips—and the Water Meter Is Cleaned." By Alexander Smolenski, Service Supervisor. *Water & Sewage Works*, July.

#### Maintenance Trucks For Water Departments

Most water departments find that special truck bodies designed for use in waterworks maintenance and repair work are advantageous. This article describes briefly the bodies used by the departments of about 60 cities, from California to Maine to Mississippi. A large proportion of them use bodies manufactured by different firms especially for this purpose; for example, 12 superintendents report the use of "Powers" service bodies; others reported are "Morrison", "Utility", "Holan." A number of departments have had bodies made after their own designs, some of them built in the department shop.

"Special Truck Bodies Speed Water Department Work." *PUBLIC WORKS* September.

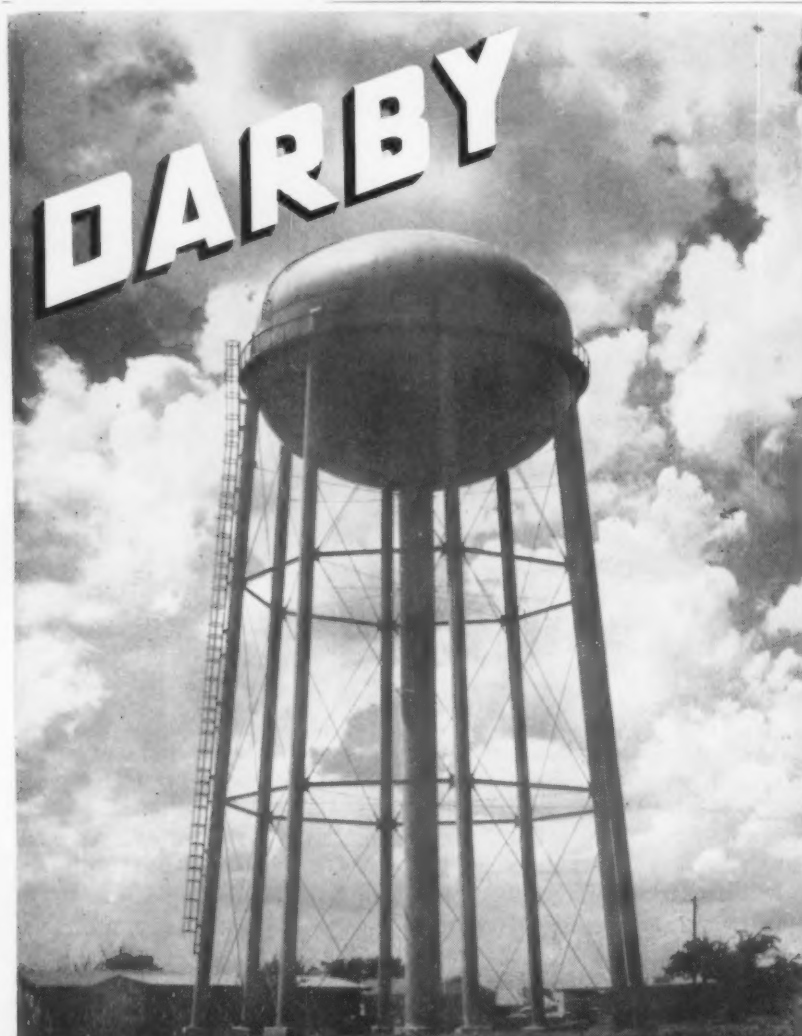
#### Other Articles

"Water Service and What It Costs: A Completely Adequate Distribution System." By N. T. Veatch. *Water & Sewage Works*, July.

"New Water Supply Facilities for Columbia, Tenn." By A. B. Jowers, Project Eng'r. *Water & Sewage Works*, July.


"Chemical Handling and Feeding." By George E. Symons. *Water & Sewage Works*, July.

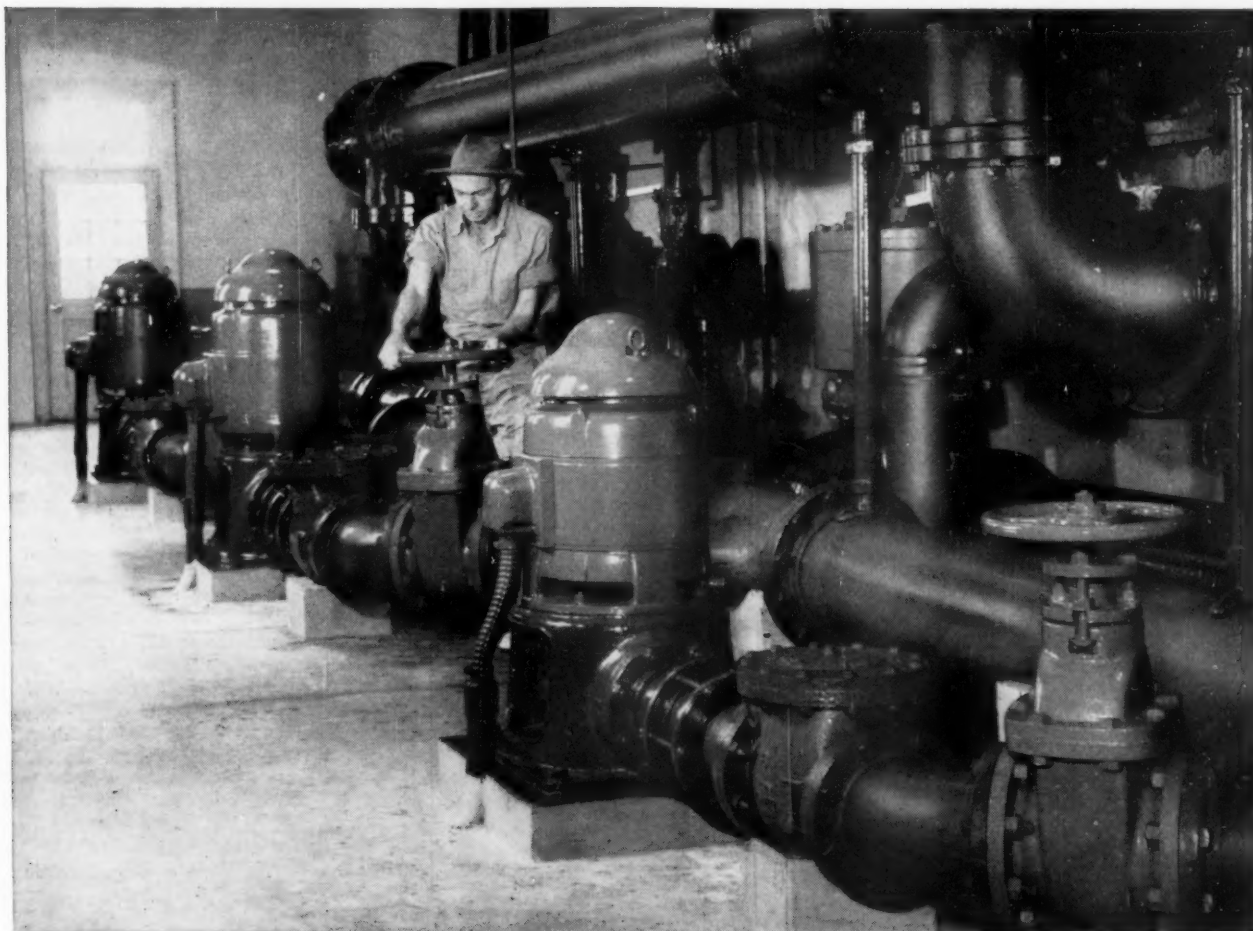
"Disposal of Radioactive Wastes—A Growing Problem." By Joseph A. Lie-



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berman, U.S. Atomic Energy Com. Civil Engineering, July.

"Safety Practice for Water Utilities." A manual prepared by a committee of the AWWA. Jour., AWW Ass'n, July.

"Effect of Inflation on Water Rates." By C. C. MacDonald, V.P., West Virginia Water Service Co. Jour., AWW Ass'n, July.

"Elements in Sizing Water Mains." General discussion. By A. T. Luce, V.P., New York Water Service Corp. Jour., AWW Ass'n, July.

"Taste and Odor Control in Indiana." Descriptions of 6 plants using different methods. By J. G. Filicky, Industrial Chem. Sales Div. Jour., AWW Ass'n, July.

"Ground Water Resources in Texas." Water is being removed more rapidly than replenished; many hundreds of millions of acre-feet remains in storage, but should be used intelligently. By R. W. Sundstrom, U.S. Geological Survey. Jour., AWW Ass'n, July.

"Tastes and Odors in Connecticut Water Supplies." Chlorine most effective in control; used in 149 plants. By Richard S. Woodhull, State Dept. of Health. Jour., New England WW Ass'n, June.

"What Water Analysis Should Mean to the Practical Superintendent." By Kenneth F. Knowlton, Supt., Salem & Beverly Water Supply. Jour., New England WW Ass'n, June.

"Maintenance of Motors and Control." By Walter Hansen, Gen. Electric Co. Jour., New England WW Ass'n, June.

"Simple Field Methods for Finding Fire Flow and Pipe Friction." By John C. Adams, Jr. Jour., New England WW Ass'n, June.

"Review of Microorganisms in Water Supplies". Classified lists and characteristics. By Samuel O. Swartz, Water Div., Metropolitan Dist. Com. Jour., New England WW Ass'n, June.

"Pneumatic Conveying of Chemicals in Water Treatment Plants." Their use in four treatment plants. By Roy H. Ritter. Water & Sewage Works, August.

"Fluoridation Gains Reported by ADA." Water & Sewage Works, August.

"Notes on Water Works Law." By John H. Murdoch, Jr., V-P., American W. W. Co., Inc. Water & Sewage Works, August.

"Restrictions on Water Use for Air Conditioning." Of 635 communities questioned, only 78 have such restrictions. Public Works, September.

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### Decentralized Paying of Utility Bills

In addition to payment of utility bills through drug stores and shopping centers, Jacksonville, Fla., has recently established a night depository at the City Hall. C. W. Hendley is City Treasurer.



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**CUTS COST ALMOST 50%** ... Extensive use of a fleet of self-loading trucks in Birmingham, Ala. reduced cost of maintenance on streets, parks and other public properties almost 50%. Mechanization of such work as spreading anti-skid material on icy streets, removal of dumpings from street sweepers, etc. offers additional savings in time, labor and equipment.

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### New Treatment Plant Serves Arvada

ARVADA, COLO., is primarily a residential town with the usually expected commercial enterprises; it has no processing or manufacturing plants that seriously affect the sewage characteristics. Therefore, the design of its new sewage treatment plant was based on standard criteria. The 1952 population was estimated to be 3,000 and the plant was designed to serve an ultimate population of 6,500. This ultimate population is expected to contribute an average daily flow of 760,000 gallons,

which flow includes an allowance for infiltration.

The plant as constructed consists of the following units: Parshall flume for measuring and recording the quantity of sewage entering the plant; grit chambers, with twin channels, manually cleaned; comminutor; primary sedimentation tank, circular, mechanically cleaned; lift station for pumping the primary sedimentation tank effluent to the trickling filter, and for recirculating a portion of the sewage flow from the filter effluent to the filter influent; trickling filter, high-rate

type, circular with rotary distributor; secondary sedimentation tank, circular, mechanically cleaned; two sludge digesters with floating covers, heated; eight sludge drying beds, underdrained, with gravel and sand drainage media; and a control building.

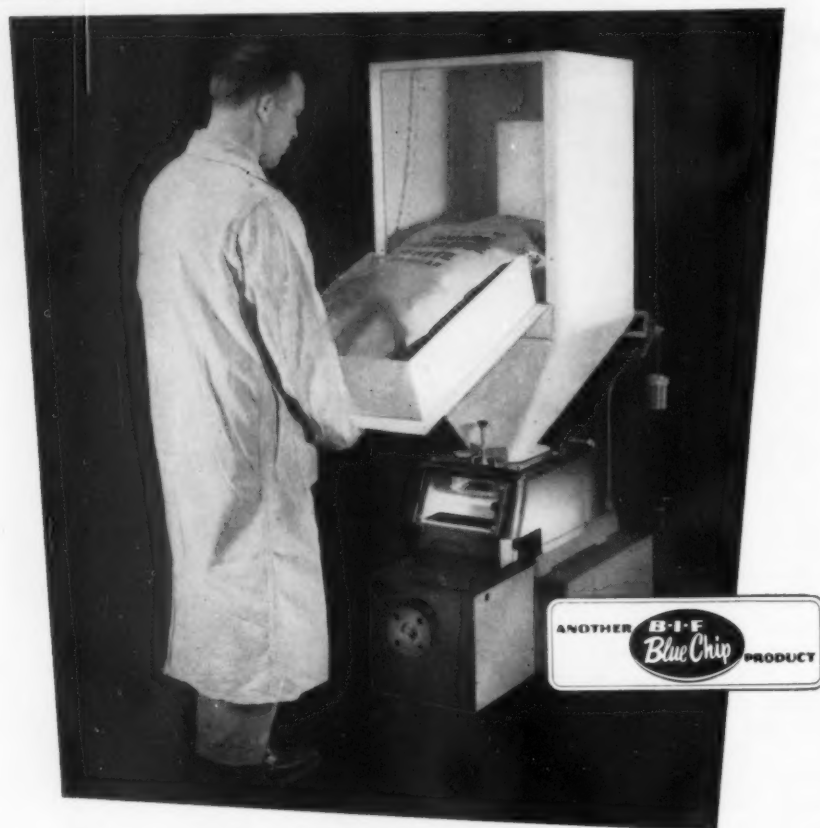
Since the site on which the original plant (built in 1939) was located, together with the additional land that the city had had foresight to procure was adequate, the new treatment plant was placed thereon. With the exception of the grit chambers and the sludge drying beds, the major structures of the original plant were incorporated into the new plant. The original sedimentation tank was modified to function as the secondary sedimentation tank in the new plant. The modification consisted of raising the peripheral weir to increase the tank's capacity, and the removal of the sludge collecting mechanism which was cleaned by sand-blasting, and increasing the depth of the setting. The entire mechanism was repainted and then reinstalled. It is interesting to note that this mechanism, a Dorr Torq-Sifed clarifier after fourteen years of continuous service was found to be in satisfactory condition, and the only materials replaced were squeegees.

The original digester was thoroughly cleaned and was incorporated in the new plant for use either as storage for poor quality supernatant or for sludge as the plant operation dictated. The old small control house was preserved for a tool storage building.

The new control building which is structurally a part of the sludge digester tanks and has two floor levels, houses the sludge pumps, the external sludge heating equipment including the circulating pumps in the basement level, and the office, laboratory and toilet on the first floor level.

The hydraulics of the plant are such that in event of a power failure affecting the pumps in the intermediate lift station, the entire primary sedimentation tank effluent automatically passes directly to the secondary sedimentation tank. However, at the operator's option, should such operation produce too long a detention time without intermediate aeration, the primary sedimentation tank effluent during a prolonged period of power or pump failure can be passed directly to the creek.

This description is condensed from Colorado Municipalities. The consulting engineer for the plant was Walton B. Colwell, Jr.



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## It's PROCESS ENGINEERS in CHARLOTTE

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Illustrated Booklet #117 gives additional information.

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## PUBLIC WORKS DIGESTS

# The INDUSTRIAL WASTE Digest



## Fission Products For Treating Wastes

Research being carried on by the Engineer Research and Development Laboratories of the U. S. Army has demonstrated that water-borne sewage can be sterilized by gamma radiation without activating or leaving residual radiation in the treated liquid. Tests made by Columbia University on pulp wastes indicate the feasibility of "borrowing" the radiation of fission waste during the cooling process to neutralize the waste; all inorganic wastes would be oxidized to their highest oxidation states, and organic substances would be decomposed into gaseous products and charred residue. W. A. Selke, project engineering manager of the Dept. of Chemistry of Columbia University, has designed a radiation treatment vessel (see illustration) consisting of a cylindrical tank at least 12 ft. in diameter and 12 ft. high, giving a minimum of 6 ft. of waste material to act as a shield for the radiation source located at the center of the vessel. Waste would enter tangentially and baffles would provide thorough mixing and equal radiation to all portions of the waste, which would leave through the bottom at the center. Another suggestion is lining sewers with clay impregnated with radioactivity.

"Waste Treatment by Fission Products." *Engineering News-Record*, August 18.

## Activated Sludge for Citrus Wastes

It has been found that it is necessary to aerate citrus wastes before methane bacteria can digest the remaining organic matter. Therefore it seemed logical to investigate a completely aerobic procedure for treating such wastes. This the authors did in connection with a co-operative research by the Florida Citrus Commission and the Florida Citrus Experiment Station. The conclusion reached is that the activated sludge process offers a prom-

ising means of treating the waste water from citrus processing plants. Although this waste is low in nitrogenous compounds, no additional quantities need be added; but it may be necessary to add small amounts of alkaline materials to maintain a favorable pH. The excess sludge may be used as a source of B vitamins for use in animal food.

"Citrus Waste-Water Treatment of Activated Sludge." By Marshall H. Dougherty, Richard W. Wolford and Robert R. McNary. Florida Citrus Experiment Station. *Sewage and Industrial Wastes*, July.

## Reclaiming Oils and Reducing BOD

In the Detroit Diesel Engine plant of General Motors, oil sludge is accumulated chiefly from soluble oil coolants, waste oils, scrub water, waxes from packaging areas and grit from grinding machines, at times containing even small parts that have fallen into the coolant system. The mixture is pumped into a self-cleaning gravity filter which consists of reticulated disposable paper supported by a continuous wire-mesh belt conveyor. Aqueous and oily liquids run

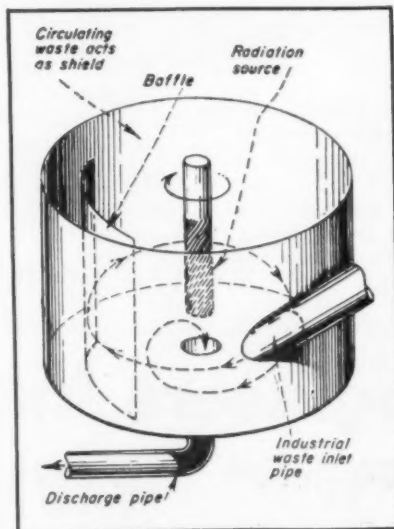
through the paper medium, and solids retained on top of it are deposited in a retainer and sold to scrap iron dealers. For breaking the emulsions in the filtered liquid, they use calcium chloride, alum and ferric chloride; also decanting, heating and several other methods. Alum has given good results when calcium and ferric chloride have failed. Oil is skimmed off and filtered through cartridge-type bag filters and used for firing boilers, having about 70% as much Btu as No. 6 fuel and at a cost about half as great. Supernatant is channeled into the plant's biological treatment plant.

"Breaking of Coolant Emulsions, Plus Biological Filtration." By C. T. Gruner, Supervisor of Plant Engineering. *Wastes Engineering*, August.

## Poultry and Canning Wastes

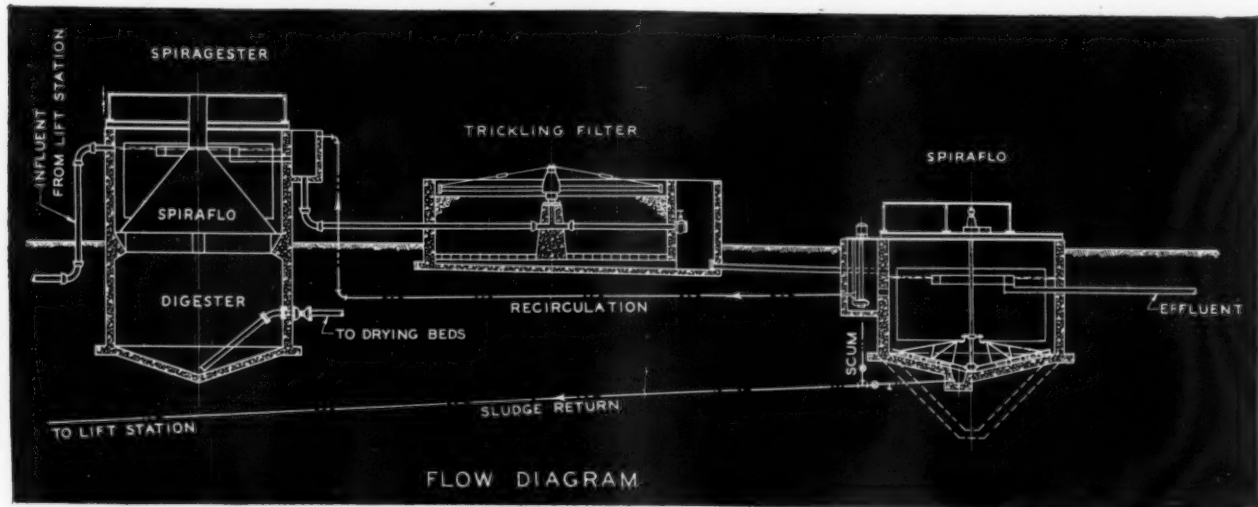
Spray irrigation for disposal of food processing wastes has recently been adopted by two poultry processing plants and a cannery in Arkansas, without resulting nuisance. The Springdale Farms poultry dressing plant drains enter a 75-gal. concrete screening tank. An upright screen of four-mesh hardware cloth fits against the sides and bottom of the tank and extends above the flow line. After screening, the wastes pass to a tank which provides about two hours storage. The waste is pumped from the tank by a 4-inch diaphragm pump and lifted to a point from which it flows by gravity to the center of the disposal field. Here is located an irrigation pump with a capacity of 125 gpm at 90-ft. head; from the pump, 400 feet of 4-inch and 300 feet of 3-inch aluminum lines distribute the water over the field.

The Hammond Poultry Processing Company uses four small tanks which have flat stationary screens. These screening tanks are arranged in series and the first two tanks have 10-mesh screens; the last two are 20-mesh. A fifth tank of the same size is utilized as a holding tank. Mounted on this fifth tank is



Courtesy Engrg. News-Record

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Settled solids in the clarification section enter the digestion compartment, mix actively with digesting material and are attacked by organisms which stabilize the sludge.

In the layout illustrated, secondary treatment is provided by a high capacity trickling filter and final sedimentation by a Spiraflo clarifier.

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a pump, which has a capacity of 125 gpm at 90 ft. head. Hammond uses 20 ft. sections of 3-inch aluminum pipe for both the feeders and lateral lines.

At the Steele Canning Company plant liquid wastes leave the plant by underground drain lines and enter the first screen house which contains a 4-mesh slowly moving screen belt mounted at a 30° angle with the horizontal. The wastes then flow to another screen house, similar to the first, with the exception of the conveyor screen which is 8-mesh. The waste leaves the

second screen house by a tile line which empties into a 700-ft. open concrete ditch, terminating in a grit chamber. At this point a bypass has been constructed to shunt the liquid to a lagoon if a breakdown occurs in the irrigation system. Normal flow from the grit chamber is over a 20-mesh shaker type screen which is mounted in a holding tank and the flow continues into a final holding tank. The irrigation pump capacity is 500 gpm at 150-ft. head, using a 30-hp motor. The irrigation feeder lines are 4 to 6-inch; the laterals are all 4-

inch. Rainbird 7/32-inch revolving spray heads are placed 60 ft. apart on the laterals.

"Spray Irrigation for Poultry and Canning Wastes." By James W. Bell. *Public Works*, September.

### Measuring Smoke Densities

A "Smokescope" has been devised by Mine Safety Appliance Co. which utilizes the principles of the Nyder gun sight. The image of two reference standards, shades 2 and 3 of the Ringelman chart, are projected into space adjacent to and in the same focal plane as the object of study. The reference standards were reduced from four to two since smoke densities greater than shade 3 violate all existing ordinances and densities less than shade 2 violate none of them.

Several instruments of this type were built with varying lengths and diameters of tubes. A unit approximating the size of a small binocular proved most satisfactory in a series of field trials, and was most convenient to use. The shield for the eye of the observer was one of the refinements made as a result of field tests. It cuts off light from behind the observer and thus eliminates reflections from the eye piece.

"A Better Method for Measuring Smoke Densities." *Public Works*, September.

### Treatment of Auckland Meat Wastes

To study the problem of overcoming harbor pollution by various industries, principally meat packing, in the Westfield area of the Auckland, N. Z., Metropolitan District, two pilot plants were constructed. The Otahuhu district plant afforded conventional type treatment involving flocculation, sedimentation, filtration, and/or activated sludge. The other, the Southdown Works of one of the meat companies, was used to determine the feasibility of anaerobic digestion as a pretreatment stage followed by a trickling filter and oxidation pond. The animals slaughtered included cattle, sheep, lambs, calves and pigs.

The Otahuhu plant wastes were brought to the plant by a tank wagon which had a working-day capacity of 6,000 gallons. The raw wastes were fed to the treatment plant during the regular working period of the meat works and arrangements were made for recirculation at times corresponding to the non-operating periods of the packing industries. The most acceptable results accrued from utilizing a

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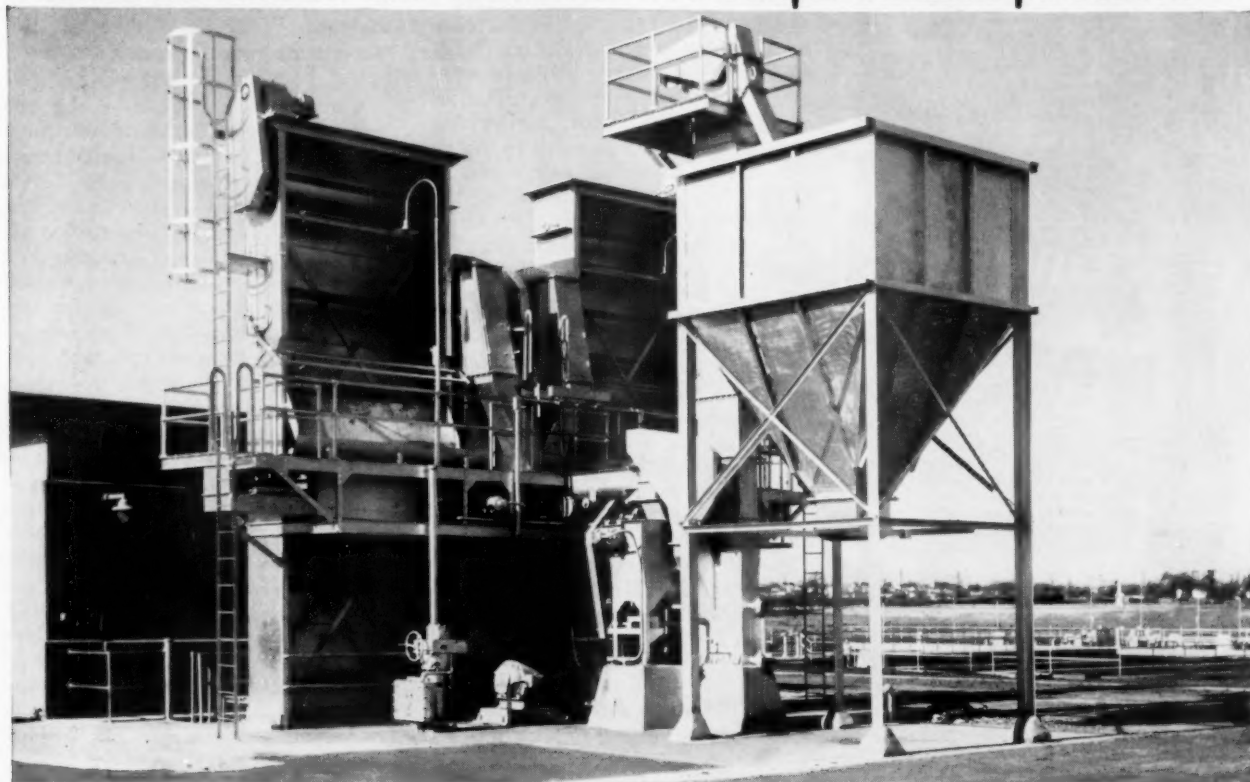
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# What's new at White Rock, Dallas, Texas?



**1953** Two Jeffrey Grit Collectors, two Screens, a Grinder and Grit Washer.



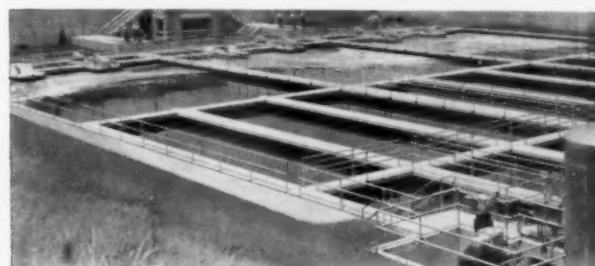
**1953** Sludge Collectors in primary and final tanks. Skimmers in primary tanks.



**1952** Two Jeffrey Screens and two Jeffrey Grit Collectors.  
**1949** Two Jeffrey Screens and a Screenings Grinder.



**1939** Sludge Collectors and Skimmers in primary tanks.




**1939** Jeffrey Sludge Collectors in the final tanks.

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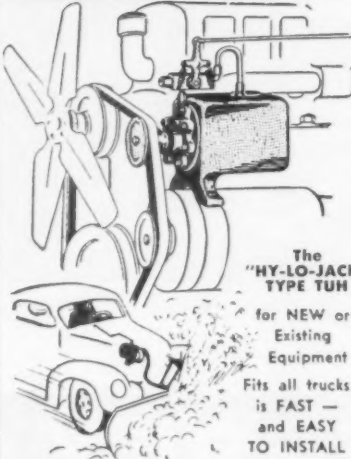
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single stage high rate filter in combination with activated sludge.

The Southdown pilot plant included a digestion unit involving a paddle stirring mechanism, grease trap, mixing and flocculation facilities, and primary sedimentation units. To overcome difficulties of sludge rising and the gas-locking of pumps, it was necessary to install a degasifier to permit separation of sludge from mixed liquor in the sedimentation tank. The carry-over of solids caused problems in the oxidation pond. After it was solved and the pond cleaned out, evidence was obtained that the use of oxidation ponds is practicable.

It was concluded that reducing the characteristics of the wastes to those comparable with domestic sewage would be feasible by application of the digestion process, and that further refinements, if desired by pollution control authorities, could be obtained by use of the conventional processes.

"Treatment of Meat Wastes." *Public Works*, September.

• • •

#### Other Articles

"Application of Biological Treatment to Industrial Wastes." A theory to explain the kinetics and equilibria of such treatment. By Roy F. Weston and W. W. Eckenfelder. *Sewage and Industrial Wastes*, July.

"Cannery Waste Disposal by Irrigation." By Profs. Gilbert H. Dunstan and Jesse V. Lunsford, Washington State College. *Sewage and Industrial Wastes*, July.

"Operation of a Phenol Recovery Plant" at Follansbee, West Va. By H. A. Kjellman, Koppers Co., Inc. *Sewage and Industrial Wastes*, July.

"Disposing of Toxic Effluents From a Rugby (England) Factory"; effluents from plating and pickling; continuous flow treatment. *Municipal Engineering*, July 15.

• • •

#### Preparing Plans for Modern Street Lighting

IN PREPARING plans for street lighting, according to a paper before the Wisconsin League of Municipalities by Eugene Odert, Director of Public Works of Portage, Wisc., the procedure is as follows: First, determine the intensity or amount of light wanted; next, select the type of lamp—incandescent, mercury vapor, fluorescent or other. Knowing the street width, the height of mounting, type of reflector and spacing of standards can be determined from tables and charts furnished by manufacturers.

The plans and specifications for the new "white-way" lights in Portage were prepared by the city public works department with the assistance of representatives of a power company and manufacturers of street lighting fixtures.

The board of public works approved using a 20,000 lumen mercury vapor lamp, in a Westinghouse luminaire with type 3 light distribution, mounted 31 feet above the street on American concrete standards with a six-foot bracket. The transformer or ballast was mounted on the top of the pole and a festoon outlet, for Christmas decoration lighting or other use, was provided 14 feet above the sidewalk. The spacing between the standards, placed on alternate sides of the street, varied from 78 to 90 feet in the heavy business blocks to a maximum of 110 feet where a high light intensity was not needed. The cable was placed in two inch Transite conduit, under the sidewalk just back of the curb wherever possible. From the electric lines in the alleys 120-volt service was taken at seven feeder points, each feeder point supplying two circuits. The circuits were laid out so that if trouble developed at any feeder point, only the lights on one side of a street would be out of service. The electric company furnished the controls at each feeder point and wired them so that all of the lights are automatically turned on or off at the same time.

The city took bids and purchased all of the materials directly. Construction of the foundations for the standards and the placing of the conduit, including breaking out and back patching the concrete, was by a crew from each of two local contractors on a time and materials basis. City crews erected the standards with the help of a county crane, and the wiring was done by a local electrician using city employees as helpers. In this manner a total of 56 lights were erected, covering about 14 blocks at a cost of \$546 per light.

To provide proper lighting for parking areas and side streets was the next step. The six parking lots servicing the business area (capacity 320 cars) are well lighted; and the streets adjacent to the business area which are used for parking have been improved by replacing the 2500-lumen open fixture lights with 6000-lumen incandescent lights in enclosed fixtures, plus new lights at those locations which previously had been dark.

# Bridging Our Highway System

**L. P. CARLSON**

Engineer of Bridge Design

Arkansas State Highway Commission

THE PRINCIPAL function of the Bridge Design Division of the Arkansas State Highway Commission is to prepare complete plans for all bridges, ranging from the most impressive river crossing to the smallest slab bridge. Whether the finished structure is to be of steel, concrete or timber, its first stage must be a layout plan prepared to a scale of 1 inch to 10 feet, or possibly a smaller scale for major structures.

When the bridge survey notes and accompanying small scale contour map of the site are received from the Surveys Division, such a layout plan is started.

Then, before going further, two questions must be answered. What type of construction shall we use? and how long must the structure be? The opening required to pass the flood waters is determined from the area and character of the land drained. Where possible a check is made against other structures on the same stream to see if the size of the new structure is in keeping with those known to be adequate.

At this stage of plan development it is necessary that we have close coordination with the Road Plans Division to insure that we are together on grades, bridge ends, and any channel work necessary for increasing the hydraulic efficiency at the bridge site.

The length of the spans to be used depends upon the height of the proposed structure, amount of drift to be passed, and the nature of the stream. Materials to be used are determined by the length of spans and the kind of traffic to be carried. Spans up to 30 feet in length are usually reinforced concrete slabs, those from 30 to 75 feet are of structural steel I-beams, and spans longer than 75 feet are usually plate girders.

Where practicable, structural steel or concrete piles are used for supports on shorter spans. Before deciding to use piling, however, the designer must determine, by a study of the borings taken, if they can be driven satisfactorily and with sufficient penetration. Where piling cannot be used on short spans, a simple two-column bent with spread footings is mostly used.

Supports for the larger bridges are almost always reinforced concrete piers resting either on firm material such as rock or on a foundation of piles driven to satisfactory bearing.

Actual designing of a bridge begins after its location, type, and material have been determined. A standard super-structure drawing is often available and if pilings are to be used, the drawing includes its supporting substructure as well.

Various angles of skew, usually 20, 30, or 45 degrees, are available and in attempting to fit the angle we can only do our best with what we have.

While most of our bridges have been designed for 2 lanes of traffic, there is a wide variation in the requirements for roadway width and capacity. Primary route bridges are built to heavier specifications than are secondary, and those on the interstate system are capable of withstanding still heavier loads. Where a secondary route bridge requires a 24-foot roadway and 15-ton capacity, this is increased to

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26-foot width and 20-ton capacity on the primary. The interstate system, as well as some other heavily traveled roads, have bridges designed to carry a 20-ton truck with 16-ton trailer and have a clear roadway width of 28 feet.

All bridges designed by the Department are made to conform to the standards of the American Association of State Highway Officials, whose standards are used almost universally throughout the country.

During the process of designing a bridge, weight of the structure, weight of vehicles passing over it, wind pressure which the bridge must withstand, and many other factors must be considered. We try to have all design calculations checked by another designer to assure accuracy; but in some instances, due to lack of time, we fall short of this ideal situation.

After all details of a design have been ironed out, drawings of the proposed structure are made showing sufficient detail for the contractor and steel fabricators to go ahead with their work after a contract has been awarded.

The company furnishing the structural steel makes a set of shop plans following the general plans

as outlined. These plans contain all steel dimensions, spacings for rivet holes, diaphragms, and all pertinent information throughout the steel portion of the bridge. Likewise, the company which furnishes the reinforcing steel submits a list and bending details of all the bars to be used on the job. In each case our Division is responsible for checking to see that all specifications are being followed.

Quantities of all items to go into a structure must be computed and checked before construction bids are requested. When those computations have been completed, bids

are called for by public advertisement and a contract is awarded; then the actual construction begins.

There has been an increase in plans for widening or otherwise altering existing bridges which are too narrow for our present-day traffic. These plans vary from a single 30-foot span, where alterations may cost several thousand dollars, to a major project. It is often overlooked that preparation of plans for such projects are more time-consuming than the original design because of the studies necessary in laying out suitable plans for such changes—*Arkansas Highways*.

## New Dam and Diversion Channel Triples Water Shed

**T**O FORESTALL repetition of water shortages that have plagued the city for several years because of drought conditions, the City Water, Light and Power Department of Springfield, Ill., last year embarked on a \$400,000 dam and diversion canal project to triple the size of the water shed serving it. With the new dam and diversion channel, Lake Springfield's present

265-square mile water shed will be extended to 850 square miles.

Work was started last year on the program which will supplement Lake Springfield's intake with water from the South Fork of the Sangamon River and from Horse Creek. The new dam, being built near the junction of these two streams, will impound water from the Sangamon and Horse Creek. As the need arises

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this water will be pumped through the diversion channel into the lake at the rate of 80 mgd a day.

Construction, which is expected to be completed so as to start gathering the runoff from spring and summer rains this year, has entailed moving some 85,000 cu.yd. of earth from the diversion channel area; constructing a half-mile long channel with depth ranging from 20 to 25 feet; and building a pumping station with a reinforced concrete base 30 feet below the ground.

The work is being done by the Sangamo Construction Company of Springfield. To move the approximately 85,000 cu. yd. of earth from the channel area, the contractor has been using two Allis-Chalmers TS-200 motor scrapers, each with a 13 cu. yd. heaped capacity. Also on the job have been five Allis-Chalmers crawler tractors with front-end shovels; and four other crawler tractors. Some have been used as pusher units for the motor scrapers.

Discussing Springfield's urgent need for relief from water shortage, T. S. Anderson, general superintendent of the Water, Light and Power department, pointed to two major factors which were causing water shortages—one, curtailment of the natural supply of water because of drought conditions resulting from dry summers and open winters; two, increasing demands for water from a growing population of people, industry and business in the Springfield area. "The city's water consumption has more than doubled since 1940", Mr. Anderson explained. "Our daily consumption has been averaging from 15 to 17 million gallons daily. This figure has jumped to as high as 25,000,000 gallons a day during extremely hot summer days."

### Playground Equipment

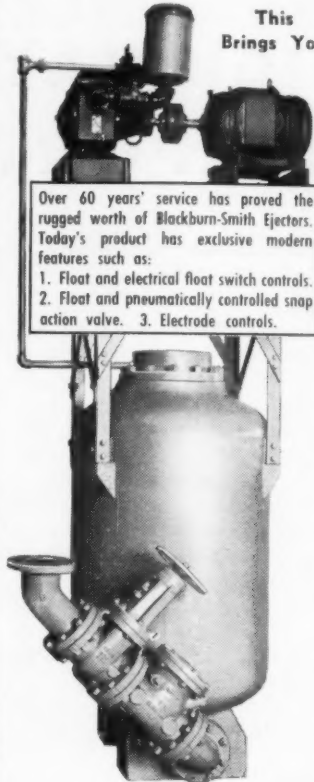
(Continued from page 113)

and benefit most when they play within their own age groups. The ideal playground should incorporate a primary play area for children two to six years; a junior area, for six to ten; and a senior area, for children ten years and over.

These points are meant to be stressed. Buy approved equipment, strong and ruggedly built to withstand the severe use and abuse to which all public recreation equipment is daily exposed. Then, install it properly, for doing so will assure superior performance, added years of trouble-free service and greater safety for the children.

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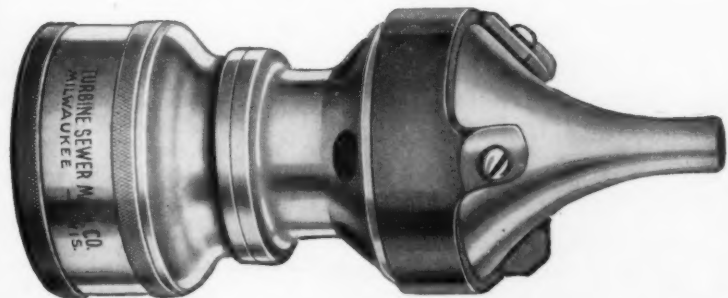
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## PUBLIC WORKS DIGESTS

# The HIGHWAY AND AIRPORT Digest



## Traffic Signs On Ohio Turnpike

In planning a signing program for the Ohio Turnpike, the basic elements were reflectorization, color and size. Recent developments in reflective sheeting permit reflectorization of color and shape, with the message visible  $\frac{1}{2}$  mile away. Directional and informational signs have a green background and silver letters. Those concerning service plazas have a blue background. As to size, the smallest are 4 ft. high by 7 ft. wide; the largest are 10 ft. high by 20 ft. wide, with letters 16 in. high, making it readable at 800 ft. The signs are made of aluminum surfaced with colored reflective sheeting.

"Modern Signing Program for Ohio Turnpike." By R. S. Deetz, Traffic Engr., Ohio Turnpike Com. *Better Roads*, July.

## Photogrammetry On a Pennsylvania Highway

About 25 miles below Pittsburgh a 2-lane highway squeezed between the Ohio river and cliffs rising up to 400 ft. had to be widened to 4-lane to accommodate the heavy traffic; also the cut was sloped back to prevent rock-falls, which had killed a number of persons using the highway. The construction now under way will provide a cut up to 250 ft. high, with benches at intervals; the first bench is 20 ft. above grade and 20 ft. wide; the second bench 40 ft. higher, and other benches at 70 ft. vertical intervals. Except the first bench, the others are 14 ft. wide. Bank slopes are 1 on  $1\frac{1}{2}$  for the first rise, 1 on  $\frac{1}{2}$  for all others. Benches will form a switchback pattern to permit access by maintenance crews.

Surveying the high, steep, wooded hillside by ground methods to obtain data for designing would have been a long, expensive process, and photogrammetry was used instead. From this, 2-ft. contours of the val-

ley floor were plotted, and 10 ft. contours of the slopes. Not only were plans prepared from these, and quantities of excavation calculated, but the contract specified that final pay quantities should be based on these maps, compared with final contour maps plotted in the same way. About a dozen contractors bid under these conditions. During construction, checks are made of the maps, which are found to be accurate within 5% plus or minus—as close as field surveying of such cliffs could be expected to come.

"Photogrammetry Speeds Start." *Engineering News-Record*, Aug. 4.

## Mechanical Resurfacing in Cincinnati

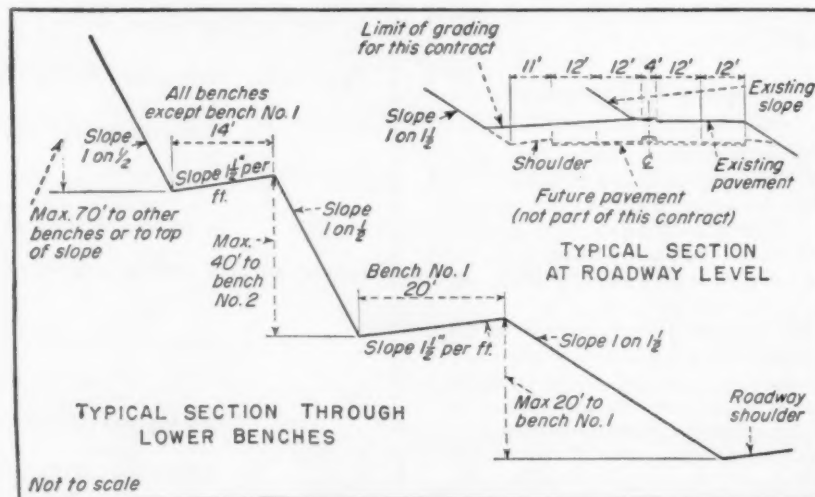
A high percentage of Cincinnati's 950 miles of improved streets are maintained in asphalt, for which city-owned asphalt plants and bituminous paving machines are used. The 1955 program includes 800,000 sq. yd. of resurfacing, a third of it for covering track areas. They have developed a technique for patching asphalt and macadam surfaces by mechanical methods rather than

hand. This involves patching larger areas than hand patching, but the cost per sq. yd. is only half as great and the resulting surface is much better. More than 80% of the work is a one-course operation, using Barber-Greene and Blaw-Knox bituminous pavers. Manhole and other castings in the street surface are raised to the new grade as short a time as possible before the patching is done; for this purpose, shim rings are used as much as possible.

"Cincinnati's Maintenance Resurfacing." By C. A. Harrell, City Manager. *PUBLIC WORKS*, September.

## Propane Gas For Street Equipment

Chicago's Dept. of Streets and Sanitation has saved well over \$30,000 a year by operating part of its maintenance fleet on propane gas instead of kerosene as formerly. The changover was made on 16 tool heaters and 18 rollers. The propane costs about the same as kerosene, but less is used and the burners last much longer and are easier to light. In the case of road rollers, they operate twice as long before a major



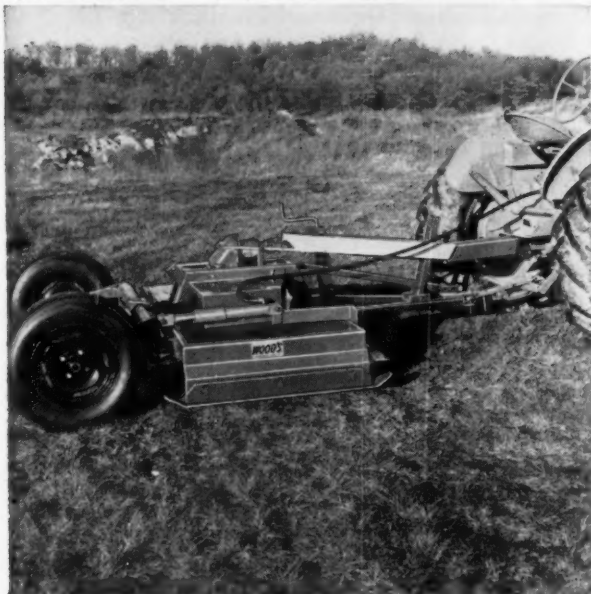
Not to scale

Courtesy Engineering News-Record

- NEW slope is being cut back in a manner that will insure that rockfalls will not reach the pavement in the future. Surveys were made from the air.



# Leaf Disposal Easy, Inexpensive with WOOD'S Tractor Mulchers



MODEL 80 (61 similar)

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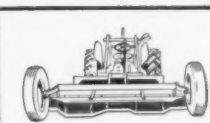
There are 12 models available in hydraulic lift or drawbar pull-type for any size tractor—42" to 114" cut—adjustable from ground to 14" high. Wood's cutters mow, clip or shred and mulch leaves—close to trees, fences or buildings.

There are 1, 2 and 3 blade models. Blades overlap for clean cutting. Equipped with shock absorbing V-Belt drive,  $\frac{3}{16}$ " boiler plate housing, 15" drop-center wheels or 8" with non-pneumatic tires. All working parts enclosed.

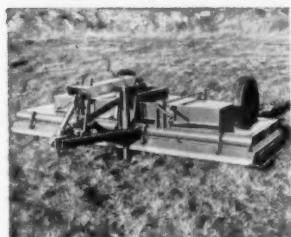
## Large Selection of Models

**Model 42C, 42A**—42" cut, single blade, for Farmall Cub and Super A. **Model 42F**—Same as 42C but rear-mounted for the Fast-Hitch Cub. **Model 5**—60" cut, single blade, for 2 plow tractors. **Model M5**—Same as 5 but mounts on 3-point hitches such as Ford. **Model 61**—61" cut, double blade, for 2 plow tractors. **Model M61**—Same as 61 but mounts on 3-point hitches. **Model 80**—80" cut, double blade, for 2-3 plow tractors. **MODEL O-80**—Same with off-set drive for working under low trees. **Model M80**—Same as 80 but mounts on 3-point hitches. **Model 114**—114" cut, triple blade, for 3-4 plow tractors. **Model 114E**—Same as model 114 but with mounted engine for use with small tractors.

## LEAF MULCHING ATTACHMENT



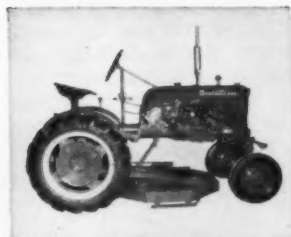
Leaf Mulcher  
available for Models  
42F, 42C, 42A, 61,  
M61, 80 and M80.



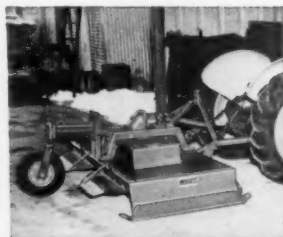
MODEL 114



MODEL 5

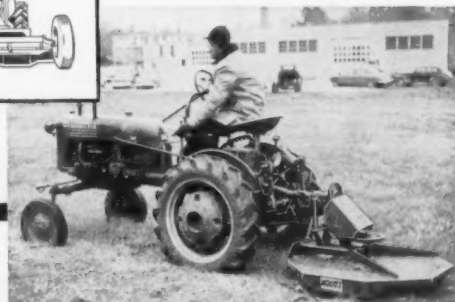


MODEL 42C (42A similar)



MODEL M80 (M61 similar)

FAST-HITCH 42F



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overhaul is necessary. By the end of this season, the 7 remaining tool heaters and 11 road rollers and some other equipment will have been converted.

"Propone Cuts Costs on Street Work." PUBLIC WORKS, September.

### Maintaining Traffic Through Construction

When repairing or reconstructing a highway, the question arises whether to maintain traffic through the work area or to detour around it. The former has recently been the more common practice; but it has been found that when contractors are required to include the cost of maintaining traffic in the unit price bid for items of work on new construction, the bid price for excavation may be increased by 50%, and the surfacing by 20%; or the cost of the entire improvement by 25%.

In maintaining traffic, it is most important to select and train good flagmen. Several states conduct schools for flagmen, who are made available to contractors. They should use a red flag not less than 14 x 18 in., on a staff at least 36 in. long, and weighted at the bottom with a

3/16 in. rod or other weight; at night, a bright red light is used, moved back and forth across the path of advancing vehicles. The flag should never be waved, but should be extended into the lane to stop or slow down traffic, and lowered to permit it to proceed.

"Maintaining Traffic Through Construction." By D. B. LaPrade, Virginia Dept. of Highways. *Better Roads*, July.

### An Airbase On a Swamp

The Navy is building an airbase in a swamp near Belle Chase, La., on an area of 3,000 acres ranging in elevation from 5 ft. above sea level to 4 ft. below. The top 65 ft. is extremely soft, with a high water content, and it is estimated that eventual settlement under the 5,000 x 300 ft. runway embankment will range from 13 to 28 in. The fill is being made with 1,500,000 cu. yd. of sand dredged from the bottom of the Mississippi river and pumped 8,000 ft. to the airbase site. An extra depth of sand is to be placed on the runway fill, adding a load 50% to 100% greater than that to be imposed by the pavement; this

sand will, after 30 to 45 days, be moved forward to surcharge the next section. This 77,000 cu. yd. of surcharge will be rehandled six times.

"The Navy Builds an Airbase on a Swamp." *Engineering News-Record*, July 21.

### Chemical Stabilization Of Weak Soils

Many soils miss being acceptable for highway use by so narrow a margin that a minor change in their physical characteristics would make them suitable. There are several types of chemicals that can produce such changes. Cost is the most serious deterrent to their use; to compete with the use of gravel to replace unsuitable soil, any substance which serves as a stabilizer when used at 10% the weight of the soil must sell for 1 cent or less per pound. But in some cases the change needed can be effected by use of only 1 to 0.01% of some chemical, if it sells for 5 cents to \$1.00 a pound. Among the possibilities are the use of aggregants and dispersants as aids to soil mixing and obtaining greater densities when using stabilizers; anti-stripping agents;

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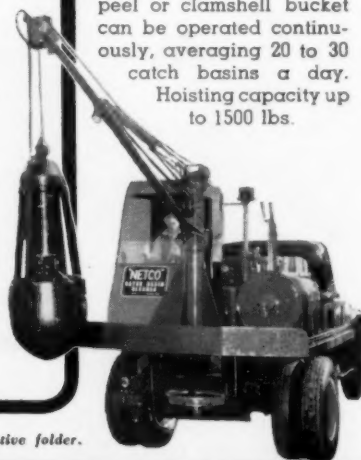
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waterproofing, as by silicones. Many companies are engaged in developing trace additives to serve these purposes, either alone or in combination with stabilizing materials such as portland cement.

"Chemical Stabilization Can Make Construction Materials of Weak Soils." By T. William Lambe, Dir. Soils Stabilization Lab., M.I.T. *Engineering News-Record*, July 1.

### Benefits of Freeways To Road Users

The Bureau of Public Roads has made studies comparing the performance of a typical passenger car over freeways and over parallel major highways with intersections at grade, and conclude that, if a car maintains prevailing overall travel speeds on each, the consumption of fuel per mile is higher on the freeway; unless the major highway has a much greater rate of rise and fall or is much more congested than a parallel freeway. However, a sizable time saving results from the use of a freeway; and usually enough saving in travel mileage to make the fuel consumption in gallons approximately the same for roads. The time spent in braking on a major highway was found to be very small, but was practically zero on a freeway.

"Operating Characteristics of a Passenger Car on Selected Routes." By Carl C. Saal, Chf., Vehicle Operations, B.P.R. *Public Roads*, August.

### Rock Salt for Stabilizing Shoulders

Last year the Pennsylvania Dept. of Highways tried several methods of stabilizing shoulders; among them, rock salt, which was used in the Scranton district. This was so successful that the 1955 shoulder program includes rock salt stabilization of all projects in six of the seven counties in the district, which includes 4,600 miles of highways. The test shoulders built last year were made 2 ft. wide, outside of which were 3 to 8 ft. of unstabilized soil. In building the 6 miles of salt-stabilized soil, the equipment used was a patrol grader with scarifier, a road mixer, a 500-gal. water tank with distributing pipe, a 12-wheel wobbly-wheel roller carrying two tons of ballast, and a rotary rock salt spreader used for ice-control work. The shoulder was scarified and mixed to a depth of 6 ins. Sufficient clay was added to make up the deficiency of the soil and a thin



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layer of  $\frac{1}{4}$  in. stone was spread, followed by rock salt at the rate of 3 lb. per sq. yd. Then the whole was mixed, and fully saturated with water and mixed again, and bladed to a slope of  $1\frac{1}{2}$  in. in the 2-ft. width. Rolling is important, especially for securing a tight bond between the pavement and the shoulder, for which purpose the mix was made sloppy wet. The rubber-tire roller, in several passes, compacted the mix from the bottom up. Later, in using the grader to remove a few ridges in the shoulder, stones up to 1 in. diameter were broken, so firmly were they held in place.

"Pennsylvania Testing Rock Salt as Shoulder Stabilizer." *Better Roads*, July.

### Access Roads To Industrial Plants

When a new industrial plant is built where there is no road from it to the nearest state or county highway, such road may or may not be built and maintained by the highway department. Nearly every state has laws making it impossible to use public funds on private roads; also provisions for making a private road into a public road and

maintained as such. In some states the industry must build its own access road but can petition the county or other local governmental unit to maintain it. In some cases the industry has donated the right-of-way or shared in the cost of construction.

"Access Roads to Industrial Plants." *Better Roads*, July.

### Other Articles

"Log Road Wetted Down With Asphalt." Sprinkling with emulsified asphalt and water proved best **dust palliative**. *Engineering News-Record*, July 28.

"Our Interstate Highway System." New design standards. By Joseph Barnett, B.P.R. Civil Engineering, July.

"New Methods Ease Florida Road Cost Problem." Use of local materials eliminates large payments on freight and reduces costs on county roads by 20%. By C. A. Peterson, Dir. of Pub. Wks. *Public Works*, September.

"It Takes Coordination to Lick Snow." By E. S. Ward, Co. Eng'r., Kandiyohi Co., Minn. *Public Works*, September.

"Sulphite Liquor Streets." Lebanon, Ore. makes stabilized bases for asphaltic concrete pavements. By G. E. Whitcomb, City Surveyor. *American City*, August.

"Precast Prestressed Concrete Bridges

for a County", Muskingum Co., Ohio. By North H. Newton, Co. Eng'r. *Public Works*, September.

"Soil-Cement Widening at Two Miles a Day", placing a 6-in. base on a state highway in Texas. By A. D. January, Eng'r., Texas State Hwy Dept. *Public Works*, September.

"Street Cleaning in San Francisco. By S. J. Sullivan, Supt. *Public Works*, September.

"Road Department Provides Recreational Facilities for All." By Harry C. Johnson, Chrmn, Ionia Co., Mich., Road Com. *Better Roads*, August.

"Paving Speed Record Set in Widening Jersey Parkway." Methods and equipment in laying 7,980 ft. of concrete in 24 hr. *Roads and Streets*, August.

"Aggregate Production for the Kentucky Turnpike." Methods of three contractors in producing crushed limestone. *Roads and Streets*, August.

"Curb Repair with Air-Placed Concrete in Indianapolis. *Roads and Streets*, August.

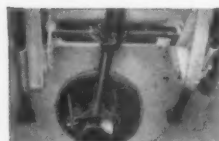
"Safety Program Halves Worker Accidents." By W. Carmen Davis, Eng'r., N.J. State Hwy. Dept. *Roads and Streets*, August.

"Base Stabilization Using Emulsion With Heated Aggregates" permitted laying during inclement weather. By L. C. Fitts, Eng'r., N.Y. State Dept. of Public Works. *Public Works*, September.



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# MAINTENANCE of STREET SURFACES

JACK D. MARKHAM

Director of Public Works,  
Two Rivers, Wisconsin

THE CONSTRUCTION of highways and streets is only the first step; they must be constantly maintained. Like everything else, highways and streets wear out. Snow, sleet, salt, rain and extreme temperatures all attack roads continually. And if we add to this list plumbers, heavy trucks and tree roots, we find that it is practically impossible to keep a street unimpaired. So that leaves the task of keeping it in "due condition, operation or force." How is this accomplished?

## Concrete Maintenance

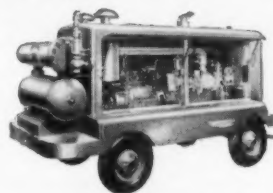
Let us begin by dividing streets into three classes—concrete, bituminous or blacktop, and the so-called unsurfaced streets. While concrete streets are generally thought of as the most durable and permanent, they still require considerable maintenance, and it usually involves the following classes of operation: (1) Sealing of joints and cracks. (2) Replacing broken areas or utility cuts. (3) Adjusting the pavement elevation to correct for settlement. (4) Repairing spalls caused by improper design or construction or resulting from accidents or unusual conditions of use.

The purpose of sealing joints and cracks is to prevent surface water seepage through the pavement openings, to exclude foreign matter and to preserve the original joint filler. Moisture in the sub-grade should be kept below the free water stage to prevent pumping at joints and cracks and to avoid damage from frost action in cold climates. Expansion, contraction and construction joints, as well as open cracks, all require re-sealing although the necessity and frequency of the re-sealing may depend somewhat on the type of joint used. Where expansion joints used in the construction of the pavement are of the extruding type, it may only be necessary to trim off the excess material forced out of the joint by expansion. However, if a possibility of infiltration seems imminent, the joint should also be re-sealed.



Trenching 7 miles of street, this Jaeger "125" Roto ran two 80 lb. breakers to line-cut and break a 7" top of asphalt over brick—averaged 1200 sq. ft. per 8 hr. day—used only 1½ gals. of fuel per hr.

## Jaeger "125" Rotary speeds street work



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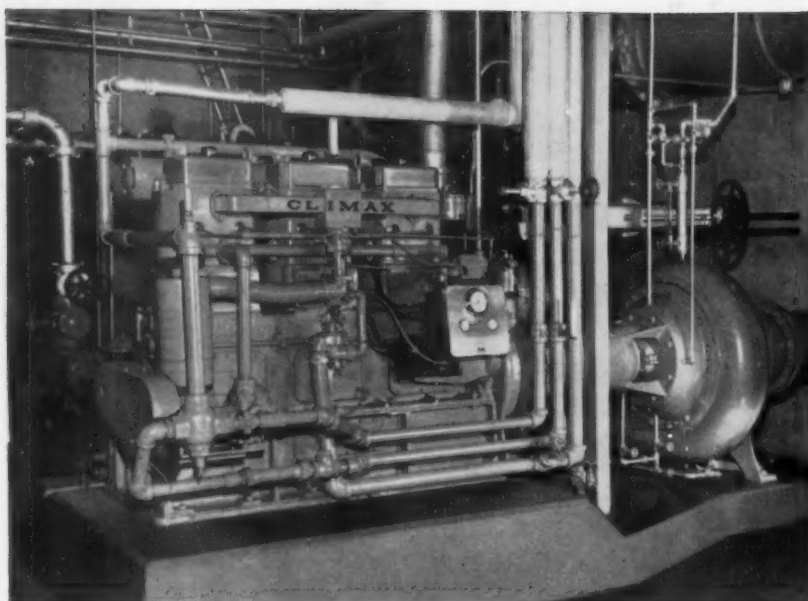
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Maintenance of any type of joint or open crack requires much the same method. It is necessary to remove all loose and foreign material from the joint before re-sealing. This can be accomplished by the use of stiff-fibre hand brooms, steel bristles or power-driven brushes. The concrete should be dry before sealing. The sealing material may be placed by the use of hand-pouring pots or by sealing machines. Unless traffic is kept off the pavement the seal should be dusted with fine sand or rock dust so that tires will not pick it up. Paper tape has also been used effectively to cover cold-poured joint seals until cured. Joints should be re-sealed as the need arises, but should be given special attention in the spring and fall.

If the old sealing material has become brittle or "dead", it is good practice to remove most of it so that the new material will have a good bond. This can be accomplished by the use of brooms, bars shaped to fit the joint space, or a number of other tools that have been found practical. The joint can be refilled as described above.

Much effort and material are wasted in attempts to seal hair cracks or narrow cracks. Unless the crack is open wide enough to permit the ready entry of sealing material, no attempt should be made to seal it.

### Utility Cuts

Broken areas and utility cuts should be replaced at the earliest opportunity. In patching, consideration should be given to the existing pavement condition and the size and shape of the patch should be determined by a qualified engineer. A cut with a concrete saw should be made along all edges not bounded by joints. This cut should be 1½ to 2-inches deep to insure a straight vertical edge for the upper portion of the patch. If a saw is not used, special care should be exercised to see that the upper edge of the old slab is as straight and vertical as possible to a depth of at least one inch.

After the cut is made and the concrete has been broken and removed, the next step should be a thorough inspection of the sub-grade. If it is determined that the breakage can be attributed to a local condition of the sub-grade, such as frost boils, frost heaves, or seepage from a water-bearing layer of soil, these conditions should be corrected before the patch is placed to avoid repetition of the breakage.



If new sub-grade material is used, it should be placed and compacted in layers of proper thickness. The edge of the old slab should be inspected to be sure it is clean and free from dust, dirt or portions of concrete which have been broken loose and have not been removed. When the new concrete is placed, the edge of the slab, as well as the sub-grade, should be moist but not wet.

In patching, a low-slump and dry concrete will usually give the best results. When it is first placed, it should be struck off and tamped at an elevation slightly higher than the intended finish of the surface of the patch. After as long a wait as permits the surface to be finished properly, the concrete should be tamped a second time, and then screeded and checked with a straight-edge to give the same contour as the old pavement. It should then be finished to have as nearly as possible the same surface texture as that of the adjacent concrete.

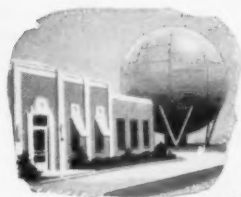
If the patch is a full-width one, contraction joints should be installed to form slab lengths of 15 to 25 ft. if the patch is 25 ft. or more long. If it is not a full-width patch, the location and spacing of the contraction joints should agree with those in the original slab. In a patch less than full-width, the same is true of expansion joints. If an expansion joint is necessary in a full-width patch, it should be placed more than 6 ft. from the end of the patch.

Because of the probable scattered location of patches, it may be inconvenient to cure by water applications. Curing membranes and impervious paper may be used, ample curing time being provided.

In adjusting the elevation of a pavement to correct for settlement, if the original surface is to be preserved, mud-jacking is most satisfactory. The surface can be built up with bituminous materials though this is seldom permanent; and, of course, it destroys the original appearance of the concrete pavement.

The method of repairing spalls depends on the cause and extent of spalling. Whatever the cause of spalling, the condition should be corrected. Concrete or other incompressible material in the joint should be removed and the joint filled with a suitable filler. Overhanging edges of concrete and all unsound material should be cut away. If the area to be restored is small, the material used for the filler may be 1:2 cement mortar

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with a low water-cement ratio, and calcium chloride may be used as an accelerator. After the unsound material has been removed and the hole cleaned out, a muriatic acid solution should be applied to the bottom and sides of the hole; this should then be thoroughly washed away; the face of the concrete brushed with a thin coat of Portland cement paste; and the depression filled with the mortar mixture. This should be vigorously tamped to insure bond between the patch and the original pavement. The surface is then struck off, edged and

finished to match the surface texture of the adjacent slab. If the spall runs the entire length of the joint, satisfactory results have been obtained by making a vertical saw cut  $1\frac{1}{2}$  to 2-inches deep, approximately six inches back from the joint and extending the length of the area to be repaired. Then the concrete in the area to be repaired is broken out with an air hammer and removed to a depth of about  $1\frac{1}{2}$  to 3-inches. The area should then be thoroughly cleaned, moistened, and a grout brushed into the surface and sides. The concrete

patching mixture, consisting of one part cement, two parts sand and three parts pea gravel, should then be placed, tamped, and finished to conform with the rest of the pavement.

### Black-Top Pavements

For black-top types of pavement, our maintenance has consisted mainly of seal coating and replacing utility cuts. In seal coating, the surface to be sealed should be swept with a power broom to remove loose dirt, clay or other objectionable matter. Bituminous material is applied and covered with fine aggregate, 100% passing a  $\frac{1}{8}$ " screen, which is then rolled beginning at the curb and working toward the center. During rolling operations, the surface should be broomed and the rolling and brooming continued until the aggregate for seal cover is embedded and the surface thoroughly compacted. The surface area treated in any one day should be limited to the amount which can be covered with aggregate and rolled.

In patching utility cuts, a usual practice is to compact the fill, as it is replaced, by tamping or flushing, then put in a base course similar to that in the original pavement and bring the patch up to grade with a cold plant-mixed asphalt. Practically all of the existing black-top streets in Two Rivers are of the tar-macadam type, and the re-surfacing of the main thoroughfare with a hot-mix asphalt mat laid over the concrete has just been completed. It remains to be seen what maintenance it will require.

### Unsurfaced Streets

Unsurfaced streets require continuous maintenance, which may not be overly expensive if proper equipment is used and the streets are kept to grade. Unsurfaced streets should have a crown of about one-half inch per foot of roadway. Probably the most frequent operation of maintenance on these streets is blading, and to be most effective this should not be done when the street is dry. Sometimes dust and dirt must be controlled on some of the more heavily travelled unsurfaced roads. The application of calcium chloride is a good method of controlling dust in climates where the humidity is not too low and it also has some stabilizing value. The best time to apply calcium chloride is following a rain and after completion of necessary blading operations.

Light oils probably furnish the most lasting and cheapest method



Fast-working steel cutters mounted on drum-type tool smoothly shave off paint lines without hurting pavement. Leaves uniformly clean surface.

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## removes traffic lines in 1 fast operation

For about 1¢ per foot... this machine provides a practical method of erasing old traffic lines. Does a complete job—without need for extra equipment, chemicals or large crews. Works up to 5 times faster than other methods. Easy handling makes it ideal for use on streets, highways, parking lots, airports, etc. Works during normal hours without tying up traffic.

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Machine has self-propelling action. Operator merely guides it over traffic lines. Cylindrical tool with scores of steel cutters revolves at 1450 rpm—smoothly shaves off paint in one operation. Covers path 4" wide; adjustable to cover path up to 7" wide.

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- Covers path 4" wide; adjustable up to 7" width.

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of dust control. In applying light oils care must be taken to obtain an adequate penetration. A cover material may be used after applying oil to prevent annoyance to pedestrians and motorists, but if a street can be blocked off, it is best to allow all the oil to penetrate into the compacted surface. It has been the experience in Two Rivers that frequent oiling of the same streets has a tendency to build up a mat which becomes rough and full of holes which need constant patching even though the cost charged for the oiling does not warrant it. It also seems that oiling streets at practically no cost to the abutting property owners only delays the eventual paving of the street.

This article is slightly condensed from the original by Mr. Markham in the Wisconsin Municipality.

## ORE PORT

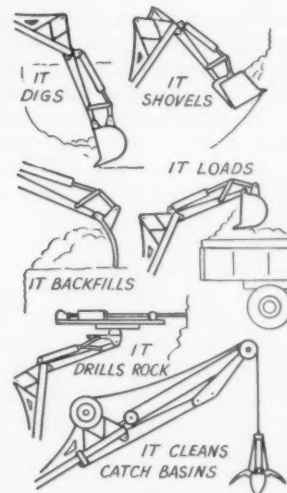
### Builds a Disposal Plant

ONE of the Lake Erie ports, that will benefit from the St. Lawrence Seaway, Ashtabula, Ohio, is raising its sights accordingly. Here the principal activity has been the transfer of Lake Superior iron ore from boats to rail, and about 9,000,000 tons a year have been shipped down to Youngstown and Pittsburgh. Ore bridges and stock piles dominate the water front. The recent "first shipment" of ore from the new Canadian mines was a pointer, for more shipments are now expected from the east, to the advantage of this port.

For the commerce expected from the seaway Ashtabula has one 2000-foot pier nearly ready for ocean-going shipping, and a second is under construction. Two more have passed the planning stage. Tonnage is expected to increase by seven or eight times within a few years after the new channel is finished.

But the city is not entirely dependent on the ore business. Since the early 1940's the chemical industry has been establishing here, and 19 industrial plants have been added. Two more new plants are being built, and six concerns are building additions. In ten years average employment has increased 79 percent as compared with 16 percent for the State of Ohio, and total wages have increased 204 percent compared with 88 percent for the State.

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This is a compact community of 30,000 persons, remaining as it has been for generations, growing conservatively by filling vacant spaces and spreading out. It retains many New England characteristics, with fine old residences, a Common, wide streets, an antique city hall, and a measured tempo in its activities.

Growth and industry are not responsible, however, for the sewage disposal plant which is now being built. The city was forced to do it by the State's determined drive to clean up the streams and lake front. For years Ashtabula had been giving its sewage no treatment other than a scant chlorine dosing, pumping it in the raw state through a 42-inch outfall line to a point just beyond the breakwater, where it spilled into comparatively shallow water. The sewage washed back over beaches, docks and other structures for miles along Lake Erie, building up a nuisance which could not be tolerated. All beaches were condemned and closed. The State's peremptory notice to stop this practice compelled immediate action.

The new plant was designed by Consoer, Townsend & Associates of

Chicago, working with Fred L. Collins, City Engineer. It is being built by Alger-Rau & Associates, of Cleveland. The cost will be \$1,087,067, financed by general obligation bonds of which \$1,300,000 worth have been sold. Engineering and other charges make up the difference between the two figures.

When the money became available the city set up a fund of \$100,000 for paying current demands. Of this only half was actually used. The remainder of the bond revenue was invested on various short terms to provide money to meet the contractor's estimates. In this venture the principal is earning money for the retirement of bonds.

### Plant Design

The plant will have a design capacity of 12 MGD; at present the flow is only 7 to 8 MGD, so there is enough reserve capacity for a number of years at the present rate of growth. Also, design is such that additions can readily be made to all the major units and there is plenty of room for installing larger feeding and mixing machinery.

It is expected that more than 65 percent of the solids and possibly

about that much of the BOD will be removed. Treatment is accomplished by the addition of chemicals, aeration, settling and chlorination. Ahead of the mixing tank the sewage is screened, and the screenings are ground up and returned to the stream; and grit is removed using the only part of the original plant that is retained.

Aeration plays a large part in the treatment process. Diffusion tubes are installed in the chemical mixing tank, the flocculation tanks, and in the aeration channels on both ends of the primary settling tanks.

The chemical mixing tank which is cast integral with the flocculating tanks, is 22 ft. long, 9 ft. wide, and 12.5 ft. deep. Chlorine and ferric chloride are added in this tank. Air diffusion tubes are set along the long side of the tank; this installation is of the swing type, with porous tubes.

Each of the four flocculating tanks is 60 ft. long by 19 ft. wide, and 12.5 ft. deep. Air diffusion tubes of the swing type are installed along the sides of two of the tanks, and in the channel between. In the aeration channels along the ends, fixed type diffusion tubes are also set.

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This sewage treatment plant had a problem of sludge disposal. The cost of incineration was prohibitive and the sludge could not be disposed of in caked form as fertilizer, even without charge.

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The four settling tanks are 84 ft. 4 ins. long, 33 ft. 6 ins. wide and 12 ft. 6 ins. maximum depth. Sludge removal equipment is the straight line type.

Four digesters are included in the design, but only three will be built now. These are 65 ft. in diameter and 26 ft. deep, faced with brick. The floating covers are furnished by Pacific Flush Tank Co., which also furnished the circulating type sludge heating equipment.

Nested between the digesters is the control building, with two levels. Its outline is irregular because of the curved walls, but it is roughly 40 ft. x 36 ft. All piping, with the gas compressor, is on the grade floor. The Administration Building, the operating center of the plant, is 105 ft. x 88 ft., with a second floor filter room 47 ft. x 29 ft. On the grade floor are a garage, engine room, two offices, the laboratory, a sludge loading room and sludge well, and the chemical storage; also a wash room, the chlorine room, and the mechanical units for feeding chemicals.

In the filter room upstairs are the two sludge filters, the ferric chloride tank, the sludge cake conveyor and dry chemical conveyors. A floor operated electric traveling crane traverses the length of the room.

A horizontal gas storage tank holds 4000 cu. ft. of gas and operates at a pressure of 30 pounds per square inch.

The two drum type vacuum filters are 8 ft. x 8 ft., with 200 square feet of effective filtering surface. Furnished by Komline-Sanderson, the estimated output is 4.5 pounds, dry solids measurement, of filter area per hour. The incoming sludge will run about 5 percent solids, and filtration is expected to raise this to 25 percent. Sludge cake will be carried from the discharge chutes on a flat belt conveyor 18 ins. wide, driven by a 1-HP motor with a worm reducer to give a belt speed of 60 ft. per minute.

Twelve pumps—raw sludge, ferric chloride, sump, sludge circulation, and protected water—were supplied by Chicago Pump Company. These range in capacity from 8 GPM at 10-ft. head to 200 GPM at 30-ft. head, though the protected water pump delivers 70 GPM at 115-ft. head.

The two vacuum pumps are double acting, reciprocating, water cooled, with individual motors; they have a displacement rating of 375 cfm, and produce a vacuum of

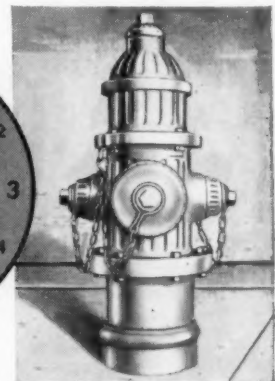
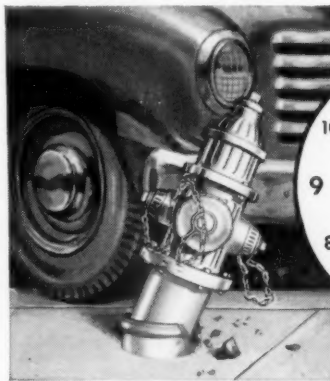
26 ins. of mercury against closed suction. The two filtrate pumps are centrifugal, deliver 60 GPM at a 20-ft. head, and are motor driven through a flexible coupling.

Gas is compressed at the rate of 60 cu. ft. of free gas per minute. It is used for heating the digesters and as fuel for the gas engines driving the generators.

Items of equipment which have not been mentioned are the crane and hoists furnished by Loudon Machine Company; chemical conveyors by Honan Crane Corporation; lime feeder by Omega; dry

chemical feeders by Infilco; blowers and drives by Roots-Connorsville; air filters by American Air Filter Company; and meters by Simplex.

Judging by the rate of growth in Ashtabula up to the present, the capacity of this plant seems to be high enough, but it may be questioned on the basis of the tremendous potential of this area for new industries attracted by the completion of the St. Lawrence Seaway. However, the plant shows excellent engineering, and is so designed as to permit of expansion without making fundamental changes.



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The Mathews Modernized Hydrant is the leader in its field because it is simple in design and quickly accessible for repair or replacement. Here are some of the outstanding features of the Mathews Modernized Hydrant.

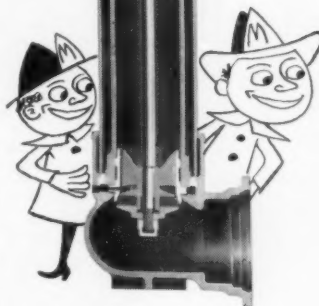
**The Replaceable Barrel.** Contains all working parts and can be replaced with another in jig time *without excavating*. When the hydrant is broken in a traffic accident, fire protection is interrupted for less than 30 minutes!

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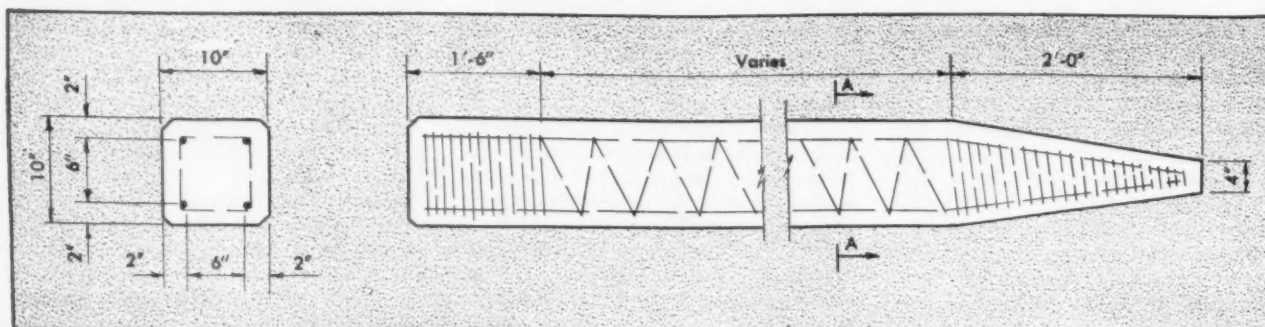
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And what's more, they are hauled by truck all over the parish and then driven with a 2000# gravity hammer. Some of our bridges have been in use for over 25 years and have been and still are carrying oil field trucks and equipment. Some of them have as much as ten or twelve feet of water flowing under them when the streams are high.

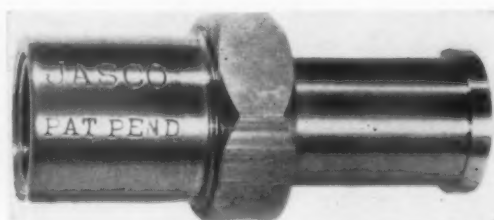
By now you probably think we are crazy; maybe we are, at any rate you don't have to read this article. You can stop now, but for those, if any, who might be inter-

ested, I will tell a little more about the pile and who we are.

The piles are poured at our central warehouse, and are reinforced with 4 1-inch round bars, wrapped with No. 9 wire spirally on a 6-inch pitch; the pitch changing to 1 inch at both ends of the pile. A 2-foot point is made on one end of the pile. One of our bridge foremen prefers to make the pile without a point. He finds it easier to hold the pile in line if the point is omitted. About one week after the piles are poured, they are moved to our cur-

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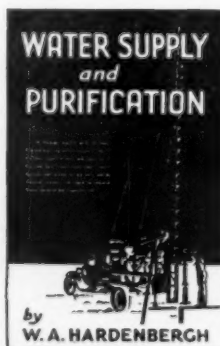
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ing site on the yard, where they remain for at least one month.

When ready for use, they are hauled by truck to any part of the parish, placed in the leads of the pile driver, and with the protection of a 3-inch wooded block to act as a cushion, are driven with a gravity hammer.

A few of the longer piles sometime break in handling, but it is very rare for one to break after it has been placed in the leads. We secure on the average about 20 feet of penetration. The heads of the piles are then broken and the steel turned back to tie into a cap which is poured in place.

From this point our design varies, we have some continuous concrete deck; some creosote wood or concrete deck placed on 12-in., 31.8-lb., steel I-beams. Most of our bridges have 25-foot spans, but we have used spans as long as 50 feet by driving a double row of piles.

What conclusion have I reached? Too much money is being spent in over designing our concrete bridges.

Caddo Parish (Parishes in Louisiana are equivalent to your Counties), located in the northwest corner of Louisiana, is about 45 miles long and averages about 20 miles wide. On the west is Texas; on the north Arkansas; and on the east the Red River. The eastern half of the parish is river bottom land and the western half is hill land. We have no gravel beds or rock formations.

• • •

### Working on Ice Speeds Shore Line Protection

**A** LONG THE Great Lakes coast, erosion control has been a problem. One method of protecting shore lines was employed at the Jefferson Beach Amusement Park, on Lake St. Clair, near Detroit, where a marina was constructed. The major feature of this is a 1500-ft. long pier with boatwells on both sides. This, with auxiliary dockage, provides wells for 350 boats up to cruiser size. The pier consists of a double roadway, 35 feet wide, elevated 3 feet above the water level, between parallel sidings of Armco sheet piling. The 8-gage sheets are 12 and 14 feet long, according to water depth, which varies from 5 feet at the shore to 8 feet in the outer part of the harbor. Sheeting was tied every 6 feet with  $\frac{3}{4}$ -inch rods and capped by 5 x 5 x  $\frac{3}{4}$ -inch angle iron.

The pier required 28,000 loads of

fill, brought largely from excavation work for new expressways in Detroit. A "fair exchange" was excavation of fine washed lake sand brought up during dredging in the marina area from the lake bottom which local contractors were glad to take away. The pier is black-topped, giving easy access by car to boatwells. Each well is equipped with electric lights, electric service outlet and a water line.

Construction was done during the winter, which afforded several advantages. Wind and waves create difficulty on this type of job. Yet

working on top of the ice, it was possible to draw a straight line on the surface, cutting a hole at intervals through which piling could be started. Checking with the plumb line was simple, working right alongside on the surface.

Wheels were placed on the pile driver, which was moved on to the ice for the installation work. This reversed the usual construction practice of putting land equipment afloat.

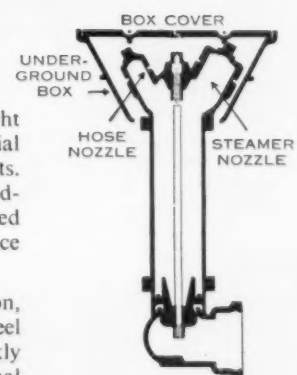
Greater efficiency and faster operation was gained by driving 4 or 5 sections of piling at a time.



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## Resurfacing a 400-ft. Wide Bridge

**T**HE PROBLEM of resurfacing a city street which also, surprisingly enough, happens to be the world's widest bridge (400 ft. wide) was solved by the use of corrugated steel flooring. The structure in Lockport, N. Y., a part of New York 31, is actually a framing of 3-hinged steel arch girders and transverse floor beams carrying a decking over the New York State Barge Canal. Because a limited budget and speed of erection were two important fac-

tors, it was decided to use structural plate bridge flooring surfaced with bituminous concrete on the most used portion.

In order to afford uniform bearing for the 7-ga. steel flooring which had 2-in. deep corrugations, new 10-in. stringers were welded to the floor beams. Oval welding holes  $\frac{3}{4}$  in. x  $1\frac{1}{4}$  in. were provided in the valley of every corrugation at every stringer; and, for drainage, similar holes were provided in the valley

of each corrugation at the quarter point between stringers.

To eliminate underside overhead painting after installation, the plates were laid bottom up, beforehand, and two coats of black paint were applied. Welding of the plates to the stringers was accomplished by using two fillet welds at every corrugation and every stringer, and plates were joined at the edges by lapping.

Before covering with the bituminous concrete, a coating of asphalt emulsion at the rate of 0.15 gal. psy was placed over the entire top of the structural plate flooring. The first of two courses of New York State specification Item 52 MX-asphalt concrete was then placed in an amount sufficient, after rolling, to fill the valley corrugations completely and densely. The final course of the MX-asphalt awaited warmer weather.

Charles R. Waters, New York State District Engineer at Buffalo, directed the project, assisted by A. L. Miller, in charge of design, F. J. Fuller, supervising engineer and G. L. Tolsma, project engineer. The structural plate was furnished by United Steel Fabricators.



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### Radiological Defense

(Continued from page 108)

ning. The Radiological Health Training Center at the Robert A. Taft Sanitary Engineering Center in Cincinnati, Ohio, has several short courses of from two to four weeks in duration.

Your State and Federal Civil Defense Councils will provide pamphlets and other written materials and will assist you financially in purchasing radiation detection instruments for FCDA projects. Upon approval by the FCDA, funds are matched on a dollar-for-dollar basis.

In many states, the State Board of Health has a Civil Defense Section and, in some cases, a Radiological Section. The various state and private educational institutions offer short courses and can be of assistance in the selection of proper equipment.

To start a program, outline it on paper, as various agencies for assistance and the details will take care of themselves. The primary hurdle is "beginning."

If your area is a primary target for an atomic or hydrogen bomb attack, you must have radiation detection equipment and trained personnel before anyone can work in the destruction area.

If a bomb is detonated as far away as three hundred miles and wind conditions carry the cloud to you, you have become a secondary target and prompt radiation protective measures are necessary to minimize casualties. The figure on page 107 illustrates the fallout pattern of the 1954 "H"-Bomb tests in the Pacific transposed on a map of North Carolina. Aiken, South Carolina, and Oak Ridge, Tennessee, were chosen as the targets and the percentage figures shown represent fatalities of those persons exposed for 24 to 48 hours to the fallout.

**Summary**—There is no doubt that radioactive fallout in times of atomic attack presents a definite survival hazard to the general public and that prompt protective measures are necessary. The effects of heat, light, and blast from a nuclear detonation are instantaneous effects whereas the effect of radiation may be prolonged. It is this element of time that enables a well organized Radiological Safety Program to offer protection to the public.

Every city and county has provided, in the past few years, various Civil Defense Programs for

their areas. These programs have had varying degrees of success. Civil Defense recommendations have changed as the authorities have learned more about the effects of nuclear weapons. It is recommended most emphatically that regardless of the type of programs organized that a policy of continued practice be followed. "Dry runs" are essential. Continued training of personnel is necessary. Once the plan has been organized and put into practice—do not stop. It is essential that interest in the program be maintained for both the participants and the public. Remember, a little planning, cooperation, and funds can result in tremendous dividends in human lives.

### Charlotte Sewage Treatment

(Continued from page 106)

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## PUBLIC WORKS EQUIPMENT NEWS

Published Monthly

October, 1955

### New Bottom-Seating Sluice Gate for Improved Flow

A flush bottom closure sluice gate, which allows more flow yet insures closure against flow in either direction, has been developed by Rodney Hunt. The frame has been lowered so that the opening is flush with adjacent chamber floors or with the natural bottom floorline. The gate seats flush with the invert. It is of cast iron bronze-mounted construction and is secured in its closed position by heavy bronze wedges on top and sides only which hold it tight against the frame. This HY-Q carries on the bottom of the gate disc a heavy strip of flexible Neoprene which flexes and gives a "cushion closing" seal. With the flush bottom closure, there is less turbulence at the bottom where head is greatest so smoother flow is possible. There is no bottom barrier or trough to accumulate silt and trash. Since the bottom of the gate is flush with the invert, drainage of the outflowing channel or chamber is complete. Because of greater head and im-



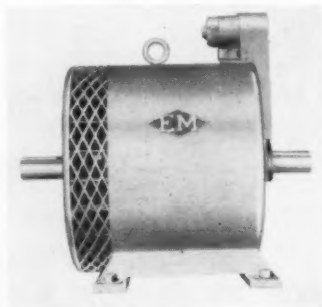
Typical installation of Rodney Hunt HY-Q flush bottom closure sluice gate

proved flow characteristics, a smaller gate size, narrower channel and lower channel walls will sometimes serve for a given volume of flow, permitting substantial economies in concrete construction work. More from Rodney Hunt Machine Co., Orange, Mass., or circle No. 10-1 on the coupon.

### Adjustable Speed Drive Designed for Flexibility

A precise adjustable speed drive for a wide field of applications has been developed by Electric Machinery. This can be coupled or belted to an existing motor to provide a speed control for fans, centrifugal pumps and compressors; it will also handle constant torque loads such as conveyors, and many other applications. The system consists of (1) the "Ampli-Speed" drive installed between the motor (or other drive) and the load, (2) a wall-mounted magnetic amplifier speed control and (3) a control rheostat at any convenient location. The drive requires no external cooling system, is handled like a motor, and is adaptable to tight space requirements. The drive is for use with motor speeds of 870, 1150, or 1750 rpm with horsepower ratings to 95

hp for fan-type loads. For constant torque loads, the output ranges up to 75 hp. For more information write to Electric Machinery Mfg. Co., Minneapolis, Minn., or circle No. 10-2 on the coupon.



Looks like a motor, but it's a magnetic speed controller

### Caterpillar Diesel-Electric Sets

The new self-regulated diesel-electric sets announced by Caterpillar combine the late developments in design and construction, have the desirable characteristics of externally-regulated sets and maintain the simplicity of operation and motor starting ability. Featuring close voltage regulation, they provide steady voltage from no load to full load. The power plants are extremely easy to install as no complicated switchgear or external voltage regulators are needed. They can be easily paralleled with most generators of any type or make now in use. Leads can be taken from the side, back or top without affecting the machine width. The single bearing is easily accessible and is lubricated from a great reservoir that requires filling only once a year. More information from Caterpillar Tractor Co., Peoria 8, Illinois, or circle No. 10-3 on the coupon.

### "Pneumaster" Filter Control System

Builders-Providence, Inc., announces its "Pneumaster" filter control system which combines effluent and wash water controllers, butterfly tight-closing control valves, control consoles and all necessary instrumentation. The system has these advantages: undivided responsibility; lower cost since tight-closing effluent valves eliminate the need for separate effluent valves; minimum maintenance resulting from the use of non-corrosive components; manual, remote, or master control of all filtration rates; low head loss with Venturi measuring section; and overload protection for transmitters and control units to prevent damage from abnormally high differentials. Write Builders-Providence, Inc., 345 Harris Ave., Providence, R. I., or circle No. 10-4 on the coupon.



### Sewer Pipe by Armco

A new type of sewer pipe is being announced by Armco. Called "Smooth-Flo" pipe, it has the structural advantages of corrugated metal pipe with the flow capacity and durability of a smooth centrifugally spun bituminous lining. The pipe was developed for storm, sanitary or combined sewers. It offers a high flow capacity yet retains the advantages of the flexible type of pipe. Additional information from Product Information Service, Armco Drainage & Metal Products, Inc., Middletown, Ohio, or circle No. 10-5 on the coupon.

### New Thor Ditch Tamper

The Thor triplex narrow ditch tamper permits backfill tamping in trenches as narrow as 10 ins. and operation at grade level in ditches to 5 ft. deep. Mounting three Thor air-powered tampers, the tool is operated by only one man. The handles may be adjusted vertically and horizontally for tamping at any level. More from Thor Power Tool Co., Aurora, Illinois, or circle No. 10-6 on the coupon.

### All-Hydraulic "Jet Trencher" for the Oliver OC-3

A handy new all-hydraulic attachment, the Jet Trencher, is designed for use with the Oliver OC-3 loader. A unique 2-point hitch permits the operator to hook up or remove the trencher in 90 seconds without leaving the tractor. With the trencher detached, the 2-point hitch holds the front end loader counterweight, or takes a number of handy attachments such as scarifier bar, grader blade, logging tongs, etc. The trencher digs to a depth of 12 feet, lifts to 11½ feet and clears 7½ feet for easy loading of high trucks. The trencher is offset to one side of the tractor to permit close parallel digging. The boom swings

## Bucyrus-Erie Announces New Hydrocrane

Jobs long considered impossible for a light, high speed truck crane can now be handled by the new all-hydraulic H-5 Hydrocrane, according to Bucyrus-Erie. It can be used for high lift, close quarter erection; heavy bucket or crane work; big lift, indoor jobs; and precision materials handling assignments.



High lifts for a truck-mounted unit are handled by the H-5 Hydrocrane

It is available as a ½-cu. yd. excavator and as a 9-ton lifting crane and can be mounted on a new or used motor truck. It has an 18,000-lb. maximum lift and can be equipped with a standard 2-piece boom (telescoping from 24 feet to 36 feet long) or with an optional high-lift, 3-piece boom (extendible from 38 ft. to 50 ft. long). Safety features include an automatic internal lock to prevent outriggers from drifting down during travel; automatic relief valves for controlled stopping without "bounce-back"; a safety valve in the hoist circuit to prevent shock due to abrupt stops, and an indicator in the operator's cab to check the load against weight limits on the capacity plate. Attachments include a low headroom type, dualram; ½-cu. yd. clamshell bucket; and a 39-in. dia. lifting magnet. Further information from Bucyrus-Erie Company, South Milwaukee, Wisconsin, or circle No. 10-8 on the coupon.

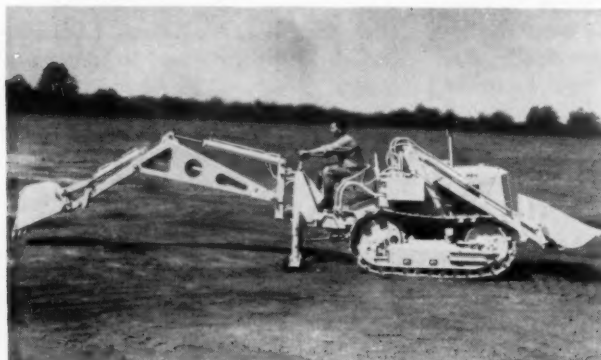
### 5-Ft. Seeder-Fertilizer Spreader

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Trencher rests on ground ready for hook-up to tractor



Accurate shoulder trenches speed highway widening jobs

## Two Types of Desludging for Solids-Contact Unit

Two different types of desludging controls for its solids-contact unit, the Reactivator, are announced by Graver. These controls have proven effective in controlling the shallow, dense sludge zone of the Reactivator to produce the minimum of carry-over. The flow-proportioned control is initiated by a flow meter which sets in successive operation first the backflush and then the blowdown valve. Each predetermined volume of water passing through the flow meter delivers an electric impulse to a counter and when the desired number of contacts has been made the counter starts the backflush timer. This backflush timer operates the solenoid pilot valve which opens the back-flush motor diaphragm valve admitting water to the desludging line and loosening packed sludge. When the backflush timer

runs out, it automatically stops the backflush operation and starts the blowdown timer. This timer then opens and operates the blowdown valve for a specified period. During the backflush period the counter is reset and resumes recording meter contacts. In the time cycle desludging control, two synchronized repeat cycle timers individually operate first the backflush valve, then the blowdown valve; as the backflush valve closes the blowdown valve opens. Then both remain closed until the backflush valve reopens and the cycle is repeated. In this way, a controlled amount of sludge is continually removed from the Reactivator. More from Graver Water Conditioning Co., 216 West 14th Street, New York 11, N. Y., or circle No. 10-11 on the coupon.

### New All-Hydraulic Bulk Material Body

The new Baughman Model SF-5 bulk material body with full hydraulic operation is available in lengths from 10 feet to 34 feet, truck or trailer mounted, with chain and flight or belt discharge. Full hydraulic operation is controlled



from rear-of-body positions. Two methods of discharge are possible: directly into grills or hoppers or onto the ground; and from the swivel conveyor (which can discharge 15 feet or more above the ground). All drives are equipped with Timken bearings. Designed for streamlined, lightweight and fast discharge, it can unload up to a ton a minute, depending on material. For information, write to Baughman Mfg. Co., Jerseyville, Illinois, or circle No. 10-12 on the coupon.

### Bulldozer Attachment for the Austin Overshot Loader

A bulldozer attachment is suitable for mounting on Model 2-C, 4-C, 6-C, 7-C, and 8-C Austin Overshot

Loaders. The machine, with the bulldozer attachment, can be used for grading, back filling and other dozing jobs. The attachment is easily installed in approximately 15 minutes by removing and replacing 4 mounting pins. Blade tilt adjustment is 15° on loaders equipped with standard buckets and 45° (cab-controlled) on front dump bucket-equipped machines. Blade and end bits are replaceable and blade sizes and weights range from 28 x 80 inches and 475 pounds for Model 2-C to 46 x 132 inches and 3,350 pounds for Model 8-C. Austin Overshot Loaders are available for mounting on Caterpillar D2, D4, D6, D7 and D8 tractors. Further data from the Austin Division, Central Ohio Steel Products Company, Galion, Ohio, or circle No. 10-13 on the coupon.

## Versatile Loader for International Utility Tractor

The Davis Model 102 Loader manufactured by Mid-Western Industries, has been specifically designed as special duty equipment for the new International 300 Utility Tractor. The loader utilizes the tractor's hydraulic system and features twin dump cylinders with down pressure, heavy-duty, box-frame construction throughout, and an 11-ft. material bucket with high carbon steel cutting edge. All standard attachments for Davis Loaders including a utility bucket, dozer blade, crane, manure fork and push-off sweeprake stacker are available. For

### Reflecto-Liners For All Your Striping Jobs

Two Wald Reflecto-Liners are said to be especially suited to marking requirements for city streets, playgrounds, and industrial plants. These two machines—Models 8 and 8T—give sharp line-definition in stripes of 2" to 6". All kinds of marking materials, plain or reflective, can be used. Accessories, such as adjustable skip-line mechanism, hand gun take-off, adjustable offset gun mount, glass sphere dispensers and hoppers, hand operated glass sphere guns and test line attachments are available. For information write Wald Industries, Inc., at Huntington, Pa., or check No. 10-14 on the coupon.

### New Line of Portable Electric Plants

A new line of portable electric generating plants has been announced by D. W. Onan & Sons. Ranging in size from 750 to 2500 watts A.C., these gasoline-driven electric plants provide on-the-spot power for electrically operated grass shears, hedge trimmers and other appliances. These portable plants are extremely compact, quick to start and simple to operate. The air-cooled engine and generator are permanently aligned. When mounted in the carrying frame (optional equipment) these compact and lightweight units can be easily hand-moved to various locations; or they can be equipped with 2-wheel dollies. Basic models of these new units are equipped with pilot light, grounding stud and 4-receptacle outlet box for multiple use of motor-driven equipment. For more, write D. W. Onan & Sons Inc., Minneapolis, Minnesota, or circle No. 10-15.

more, write Mid-Western Industries, Inc., Wichita, Kansas, or circle No. 10-16 on the coupon.



Multiple projects for all municipal departments are handled by this unit

### Triplex Ditch Tamper

The GT-5-D, Triplex Ditch Tamper, is a revolutionary ditch tool announced by Gunderson-Taylor. Newly-designed handlebars adjust both vertically and horizontally, allowing the operator freedom to



Effective tamping in narrow trenches while operator stands in the clear

work efficiently in trenches as narrow as ten inches and as deep as five feet. For additional information on the tamper or any compaction problem write to the Gunderson-Taylor Machinery Co., 1237 Shoshone Street, Denver, Colorado, or circle No. 10-17 on the coupon.

### A New Way to De-Water Sludge

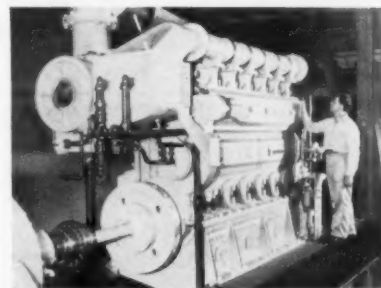
The Edco Sludge Concentrator of the Equipment Development Co., has been developed primarily for raw sewage sludge to bring the water content of the sludge to a point where the semi-dry solids may be incinerated directly without the addition of fuel. This equipment also will handle many other solids, including types of industrial wastes. The system is continuous and fully automatic with low power consumption. For details write Equipment Development Co., Inc., 363 Bloomfield Ave., Montclair, N. J., or circle No. 10-18 on the coupon.

### Reversing Transmission for Ford Tractors

A reversing transmission for use on Ford tractors, introduced by Sherman Products, provides for five forward and five reverse speeds and enables fast shuttle operations of the tractor for maneuvering into position or working with front-end equipment. Specially designed for

## Heavy Duty Diesel, Dual-Fuel and Gas Engines

A completely new design in moderate speed, 4-cycle, heavy duty diesel, dual fuel, and gas engines with ratings up to 1400 hp has been announced by Worthington. These engines are designed for service in utility and water works, sewage disposal plants, irrigation, radio and radar stations, pump or blower drive and mobile power applications. Designed as a medium sized power package at permanent installations, they are also adaptable for portable and semi-portable services. They may be arranged as a drive unit from either end, and may be equipped with any of the standard clutches, hydraulic couplings, torque converters or other



Turbocharged power is featured by the Worthington line of 4-cycle engines

power take-off equipment now on the market. Write Worthington Corporation, Harrison, N. J., or circle No. 10-21 on the coupon.

use with the Sherman fork lift attachment or with loaders, scrapers and dozer blades, the new transmission provides the same speeds in reverse as those now available in forward gear. The design permits quick and easy installation on Ford tractor models 640, NAA, 2N, 8N, and 9N. For details write Sherman Products, Inc., Royal Oak, Michigan, or circle No. 10-19 on the coupon.

### New Wayne Sweepers Operate on LPG

A major step toward broadening the applications of industrial power sweepers is the use by Wayne of new models factory built for operation with liquefied petroleum gas. The LP-Gas models are desirable where gasoline fumes are undesirable, in both inside and outside use. The new Wayne models (605 and 606) have sweeping paths of from 24 to 68 inches, and sweeping capacities of up to 110,000 square feet an hour. Vacuum hose and attachments for cleaning shelves and bins are available on all models. Hydraulic power dumping is possible while the driver remains seated. Details from Wayne Manufacturing Company, Pomona, California, or circle No. 10-20 on the coupon.

### Portable Hoist for Loading and Unloading

Pacific portable hoists are efficient in the handling of large truck tires, hydrants, drums and general cargo. The hoist has a 1000 lb. capacity with power both up and down, operated from the battery of the truck. Push button control, adjust-

able boom height, 360° swing and automatic braking at any point are features of the hoist. More from Hoist Division of Burtchae Heating Company, 2944 S. E. Powell Blvd., Portland 2, Oregon, or circle No. 10-22 on the coupon.

### Thermomagnetic Valve Tester

Service men can now quickly test B-60 and other thermomagnetic devices, including thermocouples and thermopiles, without shutting down the appliance, with the new "Detectron" T-8 automatic shut-off tester. This will locate trouble immediately in thermomagnetic and other valves. The continuity test permits the tracing of wiring in



Tester helps maintenance men check out electrical circuits

switches and automatic defrost and ice-maker circuits, as well as switches that open and close. Eight switch positions represent various current values ranging from 13 milliamperes to 565 milliamperes. Weighing only 1 pound, the T-8 is powered by a flashlight cell. Details from The Computer-Measurements Corporation, Utilities Instruments Division, 5457 Cleon Avenue, North Hollywood, California or circle No. 10-23 on the coupon.



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The City of Cedar Rapids is accepting applications for the position of Public Health Engineer. Age, 25 to 50 years. Qualifications—Degree from accredited school of engineering, either civil or sanitary. Two years experience in Public Health Work, Municipal, State or Federal. Salary: \$5200. Applications must be returned by October 15, 1955. They may be obtained by writing:

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CITY HALL, CEDAR RAPIDS, IOWA**

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Applications wanted from registered engineers to fill Assistant City Engineer position. Progressive city of 55,000. Attractive salary and other employee benefits.

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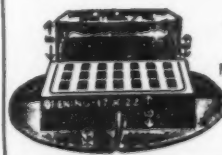
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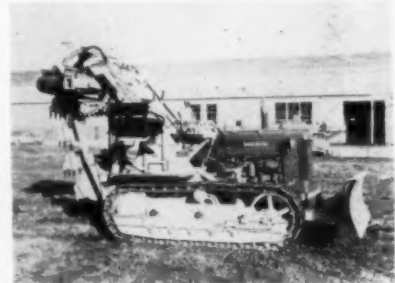
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Gray Iron and Semi-Steel Castings  
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### Utility Trencher Is Hydraulically Controlled

The Universal Trencher introduced by Heller Manufacturing, is designed for mounting on the John Deere 40 Crawler Tractor. The trencher has a digging depth of four feet and trenches 14", 16" and



**Boom-type** trencher mounts on crawler tractor, digs 14 to 18 inches wide

18" widths. It holds line and grade without effort, is hydraulically controlled and works easily in small space. It switches dirt instantly to either side and employs a heavy duty backfiller blade to replace dirt. For more, write Heller Manufacturing Corp., 1849 E. Slauson Avenue, Los Angeles 58, Calif., or circle No. 10-24 on the coupon.

### Generators Ranging Up to 500 KVA

A larger series of generators, ranging up to 500 KVA, is announced by Kato Engineering. Their new model 92 BROR, 500 KVA, 400 KW, 3-phase, 60-cycle, 1200-rpm 220/440-volt generator has an overhead belted exciter, but is also available with a direct connected exciter. This frame size will accommodate generators from 150 through 300 KW at 900 rpm and also, from 200 to 450 KW at 1800 rpm. Standard voltages are available to 2300 volts. More from Kato Engineering Co., Mankato, Minn., or circle No. 10-25 on the coupon.

### Allsteel Dump Bodies

These special Model OH 12N-3 bodies made by Galion Allsteel Body, are 8 ft. long at the bottom and 7 ft. long at the top. Headsheets are vertical and tailgates slope forward at the top. Mounted on Model 700 Galion Fulcrumatic hoists, these bodies have a payload capacity of 3 cubic yards. A special cab protector with screened window is used on the bodies. For information on dump bodies write Galion Allsteel Body Co., Galion, Ohio, or circle No. 10-26 on the coupon.

**Wagner Adds Scarifier to Line**

A hydraulically controlled industrial scarifier that operates independently of the loader is introduced by Wagner Iron Works. The hydraulic control allows the operator to set the scarifier down to the desired depth and to hold it there. Designed for use with a loader-equipped John Deere 40C tractor, the new attachment rips and loosens packed surfaces including worn and broken pavements. This permits the loader to handle loads faster, and to eliminate much wear and tear on the bucket or blade. More from Wagner Iron Works, 1905 S. 1st St., Milwaukee 1, Wisconsin, or circle No. 10-27 on the coupon.

• • •

**Industrial Wastes vs Municipal Sewage Problems**

The question, "In What Respects Does an Industrial Waste Problem differ from a Municipal Sewage Problem," was asked and answered in the following way by a recent Forum of the American Society of Civil Engineers.

There is difference in design but the objectives are similar. Municipal plants with a few exceptions handle wastes of similar physical and chemical characteristics; the volumes and concentrations can be measured as well as anticipated with reasonable accuracy. But industrial wastes vary in volume and concentration with changes in the production schedule.

Municipal treatment plants are designed for about a twenty-year period of normal operation. Basic operations in industry are subject to daily changes with wide variations in the industrial waste load; industrial waste plants can become obsolete in two to five years as a result of process developments.

Municipal sewage plants are usually remote from all other activities; sewage treatment is often a step-child in municipal affairs. Treatment of industrial wastes is a step in process and is a part of plant maintenance. Municipal plants accept the wastes discharged to the sewers. Industrial waste treatment is tied back into process operations where a change may eliminate, reduce or increase the waste load.

Municipal sewage wastes are generally comparable on the basis of solids and biochemical oxygen demand. But industrial wastes may have neither, but still be objectionable because of color, toxicity, pH, temperature, or odor.

**Trained Technical Men Available**

Man with selling experience in water and sewage equipment desires opportunity for sales engineering career. Has a degree in Mechanical Engineering and is registered professional engineer. Has had experience in design and in construction. 33 years old; married. Address D-10, Public Works Magazine, 200 South Broad St., Ridgewood, N. J.

College graduate with nine years experience in publicity, public relations and technical writing in co-operation with engineers, desires position with an organization with opportunity in this line of work. Also has edited monthly employees publication, and has had experience in radio and feature writing. Address L-10, Public Works, 200 South Broad St., Ridgewood, N. J.

Highly qualified sanitary and sales engineer, 41 married, two children, is available in the Portland, Ore., area. Highly recommended by the Editor of Public Works. Write M-10, Public Works, 200 So. Broad St., Ridgewood, N. J.

• • •

**Positions for Engineers**

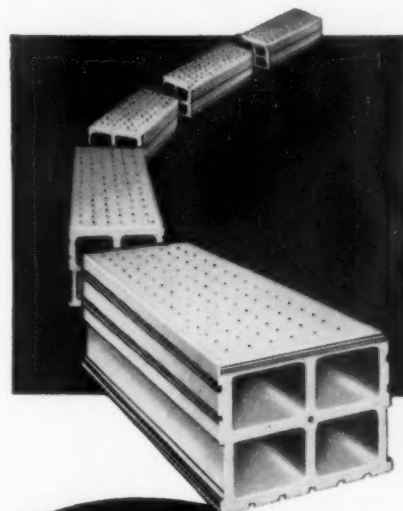
The New York District Corps of Engineers has an urgent need for engineering personnel on construction projects located throughout New York State and New Jersey. Structural, hydraulic, civil, materials, construction and sanitary engineers are needed and the pay range is from \$4525 to \$7570 per annum. Interested applicants should contact the Personnel Officer, Corps of Engineers, 111 East 16th Street, New York 3, N. Y.

• • •

**Charles A. Emerson Dies**

Engineering suffered a serious loss in the death, on August 24, of Charles A. Emerson, consulting engineer and partner in the firm of Havens & Emerson, New York City. Over a period of fifty years, his experience was largely in sanitary engineering; from 1911 to 1922 he was with the Pennsylvania Department of Health, the last nine years as chief engineer; since 1923, he was engaged in consulting engineering. Throughout the years, he contributed greatly to engineering in many other ways. He served on many city, county, state and federal engineering boards and he had a big part in the founding, development and growth of the Federation of Sewage and Industrial Wastes Associations.

## More Popular Every Day...

**Leopold**

### Glazed Fire Clay Tile Filter Bottoms

During 1954 more Leopold duplex filter bottoms were sold than in any previous year in our history. To date, there are well over 300 plants (with a daily capacity in excess of 1½ billion gallons) that have selected Leopold bottoms—including such major municipal installations as Phoenix, Arizona; Houston, Texas; Trenton, New Jersey; Detroit, Michigan; Baltimore, Maryland; Columbus, Ohio; Kansas City, Missouri; Omaha, Nebraska; and Philadelphia, Pennsylvania. Represented in this group are the five largest municipal filter plants under construction in the country at this time.

There are, of course, good reasons why the Leopold Glazed Tile Filter Bottom is getting more popular every day. In this design, laterals and distributing blocks are combined in one permanent unit that insures equal distribution and uniform filtration. The individual blocks are made of de-aired fire clay, vitrified and salt glazed. They resist corrosion, are not subject to tuberculation, won't absorb any detrimental amount of water, are impervious to acids and alkalis, and will last indefinitely.

If you're looking for a practical, economical solution to your underdrain problems, consider the advantages offered by Leopold. We'll be glad to supply details—without obligation.

Look to **Leopold** for complete water purification and sewage plant equipment...

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- Filter Operating Tables • Filter Bottoms


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## —Worth Seeing



Too slow for Sherman was surface travel when Sherman Products, Inc., decided to hold district managers'

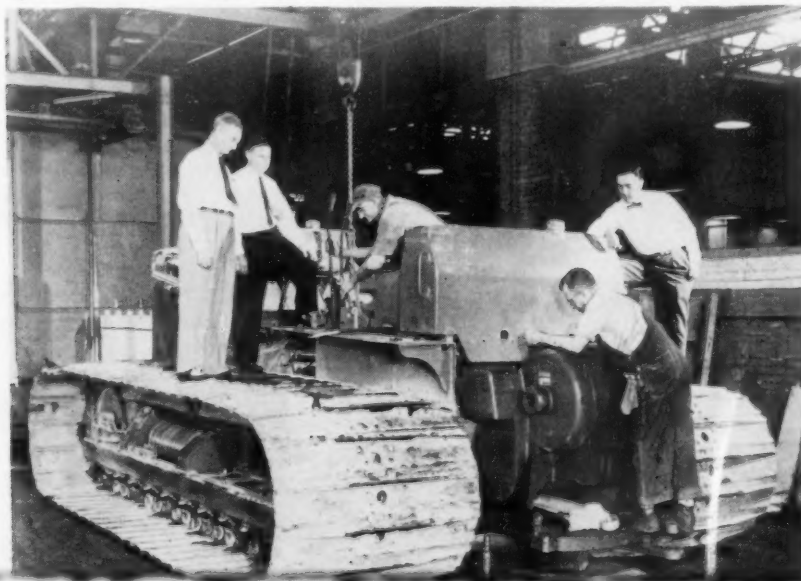
meetings practically simultaneously in their plants at Royal Oak, Michigan, and Hubbardston, Massachusetts.

Here's another way to get "up-in-the-air"—a shot from Line Material Company's new movie "Let There be Light." Scene is in Hopkins, Minn., where their 1-M-4 luminaires illuminate municipal parking lots. See also page 22.



No shirt sleeves will be in evidence when these Caterpillar track-type tractors go into service with Admiral Byrd's coming Expedition "Deep-

freeze." Twenty-one of these special machines will help set up Antarctic observation sites. Sixteen Caterpillar electric sets will be used by Deepfreeze.



## AMERICAN *Approved* PLAYGROUND EQUIPMENT

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WORLD'S LARGEST MANUFACTURERS OF FINE  
PARK, PICNIC, PLAYGROUND, SWIMMING  
POOL AND DRESSING ROOM EQUIPMENT

BRANCH PLANT AT NAHMA, MICHIGAN.

## Fire! But this building didn't burn



Just before this photo was taken, this Butler building was wrapped in flames from an adjoining fire.

## it's a fire-safe BUTLER steel building

Time and again, fire-safe Butler steel buildings have earned an unexpected bonus for their owners. In roaring infernos, they have shielded their contents—with only a few dollars worth of damage to easily replaceable covering panels. They have contained interior fires, leaving surrounding inflammable buildings untouched.

If fire strikes your present buildings—rebuild with Butler. Half finished at the factory—they are bolt-assembled in less than half the usual erection time. Besides being fire-safe, there are many more important Butler construction features that save you important money. Learn the whole story... send coupon today.



Manufacturers of Oil Equipment  
Steel Buildings • Farm Equipment  
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Factories at  
Kansas City, Mo. • Galesburg, Ill. • Minneapolis, Minn.  
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For prompt reply address office nearest you:

**BUTLER MANUFACTURING CO.**  
7321 E. 13th Street, Kansas City 26, Mo.  
921A Sixth Ave., S.E., Minneapolis 14, Minn.  
1021 Avenue W, Ensley, Birmingham, Ala.  
Dept. 21A, Richmond, Calif.

Please mail more information on  
Butler steel buildings.

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_



## WORTH TELLING

by Arthur K. Akers

★ W. E. (Ned) PUTZ succeeds Wayne Adamson, Jr., resigned, as advertising manager the Barber-Greene Co., Aurora, Ill.



Mr. Putz



Mr. Gerlitz

★ FRANK E. GERLITZ rises to vice president, sales, Simplex Valve & Meter Co., Lancaster, Pa.

★ INFILCO Inc., Tucson, Arizona, names Edward G. Kominek general sales manager.

★ ENTERPRISE ENGINE and Machinery Co. (Diesels) appoints Stuart F. Atsatt manager of its Chicago branch.

★ R. E. ROGERS heads West Coast sales, the Foxboro Co. This coincides with establishment of ten new Foxboro sales regions.

★ W. J. FARISCHON, of Caterpillar Tractor, is here shown receiving the 1954 PUBLIC INTEREST AWARD for exceptional service to



Mr. Farischon, left, receives Public Interest award from General Steward.

safety through Cat's advertising of the need for an improved national highway system.

★ S. MORGAN SMITH Co. names Joseph H. Boiegrain as assistant to

the sales manager Valve Division, succeeding Russell Ayers who enters private business.

★ GRAVER Water Conditioning Co. names the Edward G. Moninger Co., Plymouth Building, Minneapolis, as their representatives in the upper northwest.

★ D. W. LEWIS becomes chief engineer, National Slag Association, Washington. He was formerly associate professor of highway engineering, Purdue University.

★ BYRON JACKSON CO., pump makers extraordinary, win our award for handsomest booklet of the month, giving the firm's impressive history.

★ JACK McCANN is appointed government sales manager at Wash-



Mr. McCann



Mr. Errion

ington, and Jack Errion sales promotion manager, Peoria, Ill., of LeTourneau-Westinghouse Co.

★ KOEHRING COMPANY announcements include Howard H. Mobley as East-South Central territory district representative; W. B. Thompson likewise, out of San Francisco, and E. B. Hill to the new post of assistant to President Julien R. Steelman.

★ BALDWIN - LIMA - HAMILTON names E. H. Schoonmaker eastern district sales manager, Philadelphia.

★ PSYCHOLOGICAL NOTE: The inferiority complex would be a fine thing if the right people had it.

—Dickey Data.

# The Eye of RADAR



## **DETECTION FOR TRAFFIC CONTROL** *in the modern manner . . .*

The Electro-Matic® RADAR VEHICLE DETECTOR presents an entirely new concept in detection for traffic-actuated control. Situated *above* the street, the magic eye of radar operates continuously, unaffected by weather or climate. Completely electronic, it is dependable, accurate, and versatile. With no need for pavement excavation, the Model RD-1 Detector is readily moved or adjusted to roadway changes. It's easily installed on bridges, or wherever installation of regular detectors previously had been difficult.

There *are* many locations where nothing else can do the job as well, or as economically as the RD-1. Write for the copy of the new Radar Detector Bulletin D-154 for details.



## **AUTOMATIC SIGNAL DIVISION**

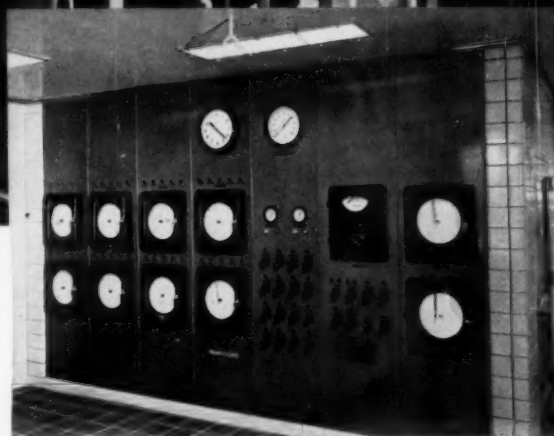
EASTERN INDUSTRIES INCORPORATED

NORWALK • CONNECTICUT





W&T Chlorinators with chlorine evaporators and master control panel (insert) used at the D.C. Sewage Treatment Plant.



## **DISTRICT OF COLUMBIA SEWAGE TREATMENT PLANT...**

### *modern concepts of sewage chlorination control*

Design of the Washington, D. C. Sewage Treatment Plant utilizes modern concepts of sewage chlorination control. W&T water diaphragm, high capacity chlorinators at the Plant are controlled from remote chlorine rate setting stations which operate by push button.

Remote control stations allow plant operators to change chlorine feed rates without leaving the operating center of the plant. Remote rate of feed indicators at the stations show the rate at which chlorine is being fed and immediately show changes in the rate of feed. Wallace & Tiernan Chlorine Flow Recorders give a permanent record

of the daily chlorine feed of each chlorinator and also the total amount of chlorine fed to each point of application.

In addition to remote chlorinator control, W&T offers many other types of accurate and effective controls which can help the operation of your plant. From simple intermittent start-stop operation through automatic proportioning of chlorine feed to sewage flow, program control based on plant flow patterns, and ORP recorder-controllers, Wallace & Tiernan can answer your chlorinator control problem.

*"Make Your First Choice  
Equipment That Lasts"*



**WALLACE & TIERNAN INCORPORATED**

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